Sun Sparc Enterprise MX000 Servers

Table of Contents

Overview

Sun Proprietary and Confidential

General Overview

Product	Internal Name
M4000	FF1
M5000	FF2
M8000	DC1
M9000	DC2/DC3
XCP 1072	XCP 1072

Facts at a Glance:

	M4000	M5000
Processor	SPARC64 VI/VII	
	2.15GHz, 2.4GHz, 5MB L2$	
	Max 4 (8/16 core)	Max 8 (16/32 core)
Memory	Max 128GB	Max 256GB
	32 DIMM slots	64 DIMM slots
	(ECC, Chip-kill, Mirror)	(ECC, Chip-kill, Mirror)
Internal Disks	Max 2 (2.5" SAS)	Max 4 (2.5" SAS)
Removable Media	DVD, DAT	
I/O Unit (IOU) Interfaces	2 x 10/100/1000 Mb HDX/FDX Ethernet ports 4 x 8 lane PCIe slots 1 x 133Mhz PCI-X Slot	
Default/Max Number of IOU's	One/One	One/Two
External IO Expansion	Yes	
Default/Max of Internal HD's	2/2 x 73 GB	2/4 x 73 GB
Enclosure	6U	10U
Redundant Parts	Disk, PSU, Fan	
Hot-swappable parts	Disk, PSU, Fan	
Power Options	1-phase 1+1 cables	1-phase 2+2 cables
Domains	Max 2	Max 4
RAS Management	XSCF (service processor)	
Power	2350W	4700W
BTU/hr	8,018	16,036

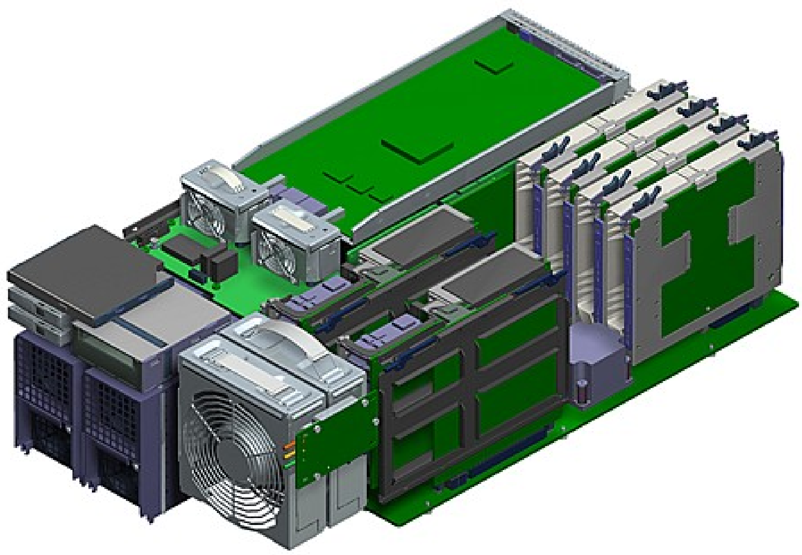
	M8000	M9000	M9000-64
Processor	SPARC64 VI/VII		
	2.28GHz, 5MB L2$ or 2.4GHz, 6MB L2$, or 2.52GHz, 6MB L2$		
	Max 16 (32/64 core)	Max 32 (64/128 core)	Max 64 (128/256 core)
Memory	Max 512GB	Max 1TB	Max 2TB
	128 DIMM slots	256 DIMM slots	512 DIMM slots
	(ECC, Chip-kill, Mirror)	(ECC, Chip-kill, Mirror)	(ECC, Chip-kill, Mirror)
Internal Disks	Max 16 (2.5" SAS)	Max 32 (2.5" SAS)	Max 64 (2.5" SAS)
Removable Media	DVD, DAT		
CMU (System Board)	Max 4 each	Max 8 each	Max 16 each
# of I/O Units (IOU) Note: CMU reqd in corresponding slot	1-4	1-8	1-16
# of 8 Lane PCIe Slots per IOU	8		
Max # of PCIe Slots	32	64	128
External IO Expansion	Yes		
Redundant Parts	CMU, IOU, XSCF, Disk, PSU, Fan	CMU, IOU, XSCF, Clock board, Disk, PSU, Fan, XBU	
Hot-Swappable Parts	CMU, IOU, XSCF,	CMU, IOU, XSCF, XBU*,	
	Disk, PSU, Fan	CLKU*, Disk, PSU, Fan	
Power Options	1-phase/3-phase/dual-grid		
Max Power	10,500 [W]	21,300 [W]	42,600 [W]
	11,000 [VA]	22,400 [VA]	44,800 [VA]
BTU/hr	35,834	72,693	145,385
Domains	Max 16	Max 24	
RAS Management	2 x XSCF (service processor)		

* CLKU and XBU hot-swap will be a post-RR feature.

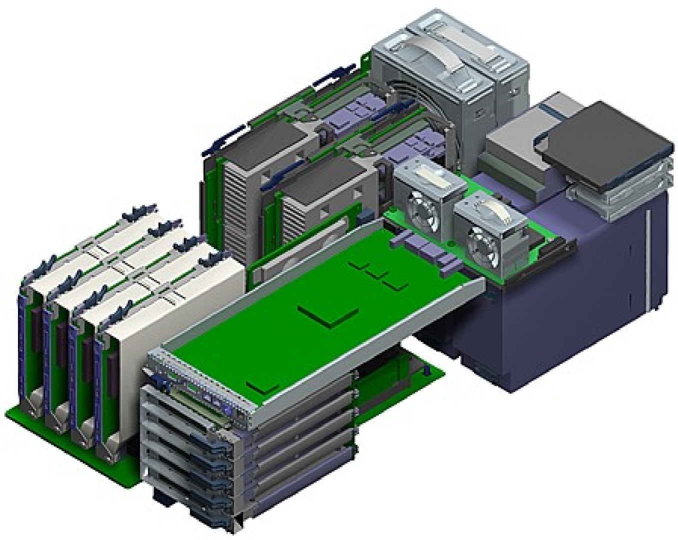
M4000/M5000 Product Overview

Both midrange servers are based on the SPARC64 VI/VII processors.

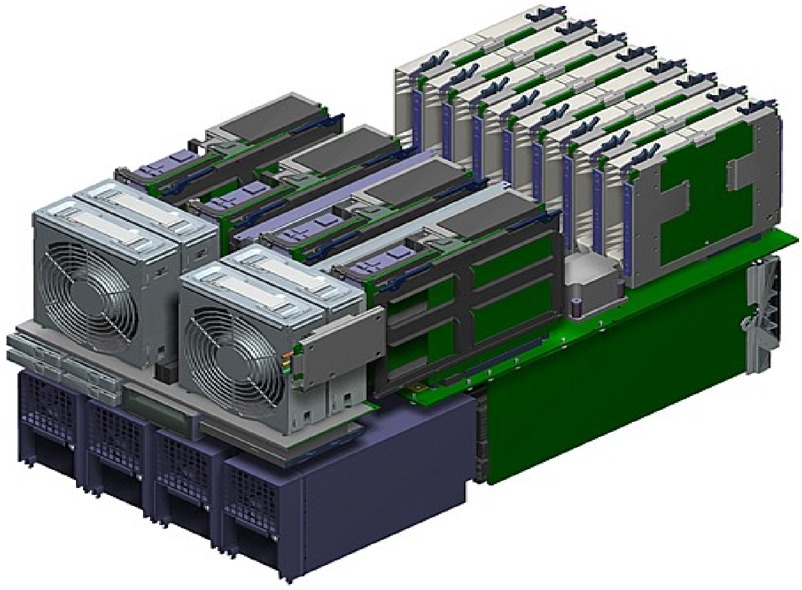
M4000 Front View



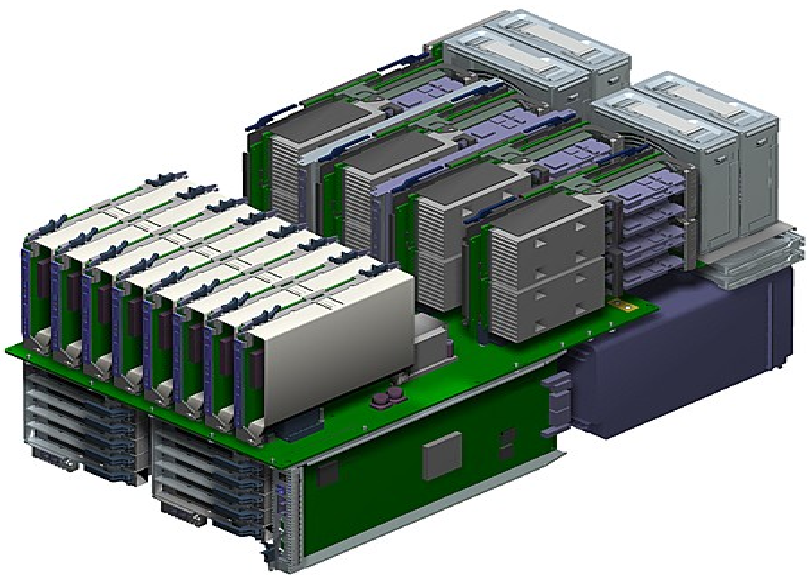
M4000 Rear View



M5000 Front View



M5000 Rear View



Front view of the SPARC Enterprise SPARC Enterprise M4000 and M5000 servers.

Sun SPARC Enterprise M4000 Details:

Software	Details	Notes
Operating System	• Solaris 10 (11/06)	• Solaris 10 is pre-installed on all server configurations.
Additional Software	Pre-installed Software	• Java Enterprise System is preloaded at the factory and available for immediate deployment. • The Java Enterprise system pre-load does not entitle commercial use, it is for evalutation purposes only. • Ships with a 90-day evaluation and is feature-complete.
Hardware	**Details**	**Notes**
Processors (CPU's)	Up to 4 Processors	The M4000 motherboard has (2) available CPU module connectors to install "CPU Modules". (2 or 4) processors can be installed into the M4000 via (1 or 2) "CPU Modules". • Supports SPARC64 VI Dual-Core CPU Modules • SPARC64 VI CPU Modules include: 2.15GHz • System memory is not located on the CPU modules, it is located on separate memory modules. • Each SPARC64 VI (Olympus-C) processor contains two cores. • Each core supports two CMT strands. • Each core has its own L1 cache: • L1 D-cache 128 Kbytes • L1 I-cache 128 Kbytes • Both cores share the L2 cache. • L2 cache 5 Mbytes (10-way interleave) • Capacity on Demand (COD) configurations are available.
Memory	Maximum of 128GB	• Memory DIMM slots are located on Memory modules. • The M4000 motherboard has (4) memory module connectors to connect memory modules. • A max of (4) memory modules can be installed in a M4000 server. • A memory module: • Contains (8) DIMM slots • Holds 1, 2 and 4GB DIMM's • The M4000 provides extended ECC memory protection (chip off-lining) and mirroring, end-to end ECC memory protection.

Power Supplies	Includes 2 power supplies Includes 2 fan trays	• The M4000 comes with N+1 Redundant Power Supplies (2 total). • A fully configured M4000 server can operate with (1) power supply. • Power supplies and fan trays are hot swappable • Standard power cords are included with the M4000 server and are designed to connect the the Sun Rack 1000 MPS power option. Therefore no power cords need to be specified for the Sun SPARC Enterprise M4000 server used with the Sun Racks. However, option power cords can be specified for use with alternate power sources.
Internal I/O Unit	(1) I/O Unit configured with each server.	• The M4000 requires (1) I/O Unit to be installed in the system. • The Internal I/O Unit is Hot-Pluggable. The I/O Unit can accomodate : • (4) X8 PCI-E slots • (1) 64-bit PCI-X slot @ 133MHz **Additional Notes:** • (1) PCI-E slot in an IOU will be needed for **each** *Optical Link Card* or *Copper Link Card being used to connect the External I/O Expansion Units to the M4000 server.* • *Each I/O Boat contains a seventh slot for the first Optical Link Card or Copper Link Card connection to the internal IOU in the server.* • *(1) Optical Link Card or Copper Link Card is required for each I/O Boat of an External I/O Expansion Unit.* • *Additional Optical Link Cards and Copper Link Cards can be installed in any slot in the IOU.* • *A max of (4) Link Cards are supported in an IOU.*
External I/O Unit	Maximum of (2) External I/O Units can be configured within the system.	• Each External I/O Expansion Unit houses (1 or 2) PCI-E or PCI-X I/O Boats. • Each I/O Boat has (6) PCI-E or (6) PCI-X slots. • PCI-E and PCI-X I/O Boats can be mixed within an External I/O Expansion Unit.. • (1) PCI-E slot in an IOU will be needed for **each** *Optical Link Card* or *Copper Link Card being used to connect the External I/O Expansion Units to the M4000 server.* • *Each I/O Boat contains a seventh slot for the first Optical Link Card or Copper Link Card connection to the internal IOU in the server.* • *(1) Optical Link Card or Copper Link Card is required for each I/O Boat of an External I/O Expansion Unit.* • *Additional Optical Link Cards and Copper Link Cards can be installed in any slot in the IOU.* • *A max of (4) Link Cards are supported in an IOU.*

Extended System Control Facility (XCSF)	Monitoring/Control Faclility	• The XSCF firmware runs on the service processor system. • The board with the installed XCSF firmware is called the XSCFU (XSCF Unit). • The XSCF Unit for the M4000 is physically different than the XSCF Unit for the M8000/M9000. • Manages hardware configuration and health, domain configuration and status, error monitor and notification facility. **XSCF Unit Technical Specs:** • 533-MHz PowerQICC CPU. • 512-MB DRAM main memory. • 1-GB NAND Flash memory. • A version of Embedded Linux operating system.
Internal Disk Drives	Maximum of (2) SAS drives.	• Up to (2) hot-plugable 73GB 10K RMP 2.5" SAS Disk Drives. • 146GB drives are currently supported in the M4000 but they are not part of any standard config, thus drives from standard configs (73GB) would have to be removed and replaced with the with x-option 146GB drives.
Internal DVD-ROM	Includes (1) DVD-ROM.	• All M4000 configurations come with (1) DVD-ROM drive.
Internal Tape Drive	Optional DAT Tape Drive.	• Up to (1) DAT Tape Drive can be installed in the M4000.
Internal Floppy Drive	None	
External Ports	**Details**	**Notes**
SCSI	None	
Fibre Channel	None	
Ethernet	(2) Ethernet ports	• (2) integrated 1-Gbit Ethernet ports.
Serial	None	• Legacy SAI/P PCI Adapters can be used in the M4000 PCI-X slot on the I/O Unit or in the optional External I/O Expansion Unit at GA.

XCSFU	See Notes.	**The XSCFU provides several external interfaces for communication including:** • A serial port (RJ-45) that can be used to access the CLI. • Two 10/100 Ethernet ports on which both the CLI and a browser-based interface is available. • USB port that a field engineer can use to download hardware information. • An uninterruptible power control (UPC) port to connect the system to a UPS.
Parallel	None	
USB	None	
Keyboard	None	
Video	None	• The XVR-200 and the Legacy 2D XVR-100 graphics card may be installed for display/visualization only. • The XVR-200 will be supported at GA. • Legacy 2D XVR-100 graphics card can be used in the M4000 PCI-X slot on the I/O Unit or in the optional External I/O Expansion Unit at RR. • XVR-300x8 graphics accelerator, 24-bit color. • The graphics card can not be used as a system console display.
Audio	None	
Other	None	
External Storage	**Details**	
Disk Storage	D240, FLX280, ST2540, 3120, 3320, 3510FC, 3511, 5320 NAS, 6140, 6540, FLX380, 9910, 9960, 9970, 9980, 9985, 9990, EMC Symmetrix	
Tape Storage	DAT 72 Rackmount, LTO3 Rackmount, LTO2V Rackmount, SDLT600 Rackmount, DAT 72 Desktop, DAT 72 USB Desktop, LTO3 Desktop, LTO2 Desktop, LTO2V Desktop, SDLT600 Desktop, SDLT320 Desktop, C2, Legacy STK L20, Legacy STK L40, Legacy STK L80, C4, L180, SL500 (LTO), SL500 (Mixed Media), L700e, L1400M, SL8500	

Supported Boot Devices	Details
Primary Boot Device	• The (2) internal disks in the M4000. • The M4000 can not boot from any storage attached to an External I/O Unit.
Additional Supported Boot Devices	
	Sun StorageTek 2540
	Sun StorageTek 6140
	Sun Storage 3120
	Sun StorEdge 3510FC
	Sun StorEdge 9980
	Sun StorEdge 9985
Physical Specs	**Details**
Height	10.3" (263 mm)
Width	17.5" (444.5 mm)
Depth	32.7" (831 mm)
Weight (max)	185 lbs (83.9 kg)
Electrical Specs	Details
Input Voltage	100-240 VAC, 47-63Hz
Input Current	24.0A at 100 127 VAC, 12A / cord 12.0A at 200 240 VAC, 12A / cord
Power Consumption	2,350W (Max)
BTU's	8,018 BTU/hr max

Rack Info	Details
Rack Units	6RU enclosure.
Supported Racks	• The standard power cords included with the M4000 are designed to connect to the Sun Rack 1000-42 with either 60A 3-Phase or 32A 3-Phase MPS power systems ONLY. • No power cords need to be ordered for the M4000 when using the Sun Rack 1000-42 with 60A 3-Phase or 32A 3-Phase MPS power systems. • The M4000 is NOT supported connected to the PDS power option in Sun racks. • Alternate power cords can be specified for use with alternate power sources. • It is recommended to use a rack extension (XRACK-EXTEND38RU) when installing the M4000 and M5000 servers into the Rack 900-38. • 900-36N is supported but not recommended, there is no extender for 900-36N thus the M4K and M5K protrude from the back of the rack. • Sun Rack 900-36N (Support may vary by GEM) • Sun Rack 900-38 (Support may vary by GEM) • Sun Rack 1000-38 • Sun Rack 1000-42 (Recommended) • The M4000 and M5000 systems include power cords to connect to the MPS inside the Rack 900-38. **The included power cords work with either the 60A 3-Phase or 32A 3-Phase MPS Power Systems ONLY.** The rack PDS power systems are not supported for the M4000 and M5000. If the MPS options are not acceptable, then optional NEMA (US) or IEC (EMEA) power cords can be ordered to power the M4000/M5000 outside of the MPS rack power option. • It is recommended to use a rack extention (XRACK-EXTEND38RU) when installing the M4000 and M5000 servers into the Rack 900-38.

Sun SPARC Enterprise M5000 Details:

Software	**Details**	**Notes**
Operating System	• Solaris 10 (11/06)	• Solaris 10 is pre-installed on all server configurations.

Additional Software	Pre-installed Software	• Java Enterprise System is preloaded at the factory and available for immediate deployment.
		    • The Java Enterprise system pre-load does not entitle commercial use, it is for evalutation purposes only.
		    • Ships with a 90-day evaluation and is feature-complete.

Hardware	Details	Notes

Processors (CPU's)	Up to 8 Processors	The M5000 motherboard has (4) available CPU module connectors to install "CPU Modules". (2, 4, 6 or 8) processors can be installed into the M5000 via (1, 2, 3 or 4) "CPU Modules".
		
		• Supports SPARC64 VI Dual-Core CPU Modules
		    • SPARC64 VI CPU Modules include: 2.15GHz
		• System memory is not located on the CPU modules, it is located on separate memory modules.
		• Each SPARC64 VI (Olympus-C) processor contains two cores.
		• Each core supports two CMT strands.
		• Each core has its own L1 cache:
		    • L1 D-cache 128 Kbytes
		    • L1 I-cache 128 Kbytes
		• Both cores share the L2 cache.
		    • L2 cache 5 Mbytes (10-way interleave)
		• Capacity on Demand (COD) configurations are available.

Memory	Maximum of 256GB	• Memory DIMM slots are located on Memory modules.
		• The M5000 motherboard has (8) memory module connectors to connect memory modules.
		• A max of (8) memory modules can be installed in a M5000 server.
		• A memory module:
		    • Contains (8) DIMM slots
		    • Holds 1, 2 and 4GB DIMM's
		• The M5000 provides extended ECC memory protection (chip off-lining) and mirroring, end-to end ECC memory protection.

<table>
<tr><td>Power Supplies</td><td>Includes 4 power supplies
Includes 4 fan trays</td><td>The M5000 comes with 2+2 Redundant Power Supplies (4 total).
Second and fourth supplies are redundant.
Power supplies and fan trays are hot swappable
Standard power cords are included with the M5000 server and are designed to connect the the Sun Rack 1000 MPS power option. Therefore no power cords need to be specified for the Sun SPARC Enterprise M5000 server used with the Sun Racks. However, option power cords can be specified for use with alternate power sources.</td></tr>
<tr><td>Internal I/O Unit</td><td>Up to (2) I/O Units can be configured with each server.</td><td>Each I/O Units contains:
(4) X8 PCI-E slots
(1) 64-bit PCI-X slot @ 133MHz
(2) SAS disk bays
(2) Gigabit Ethernet ports
I/O Unit Notes:
The M5000 requires (1) I/O Unit to be installed in the system.
The Internal I/O Unit is Hot-Pluggable.
The servers come with PCI cassettes for the I/O Units.
To use an IO tray, each system board must have a minimum of (1) CPUM board and (1) MEM board.
For example: When using (2) I/O trays, it is required to have (2) cpu module boards and (2) memory boards.
Additional Notes regarding the external I/O units:
(1) PCI-E slot in an IOU will be needed for each Optical Link Card or Copper Link Card being used to connect the External I/O Expansion Units to the M5000 server.
Each I/O Boat contains a seventh slot for the first Optical Link Card or Copper Link Card connection to the internal IOU in the server.
(1) Optical Link Card or Copper Link Card is required for each I/O Boat of an External I/O Expansion Unit.
Additional Optical Link Cards and Copper Link Cards can be installed in any slot in the IOU.
A max of (4) Link Cards are supported in an IOU.</td></tr>
</table>

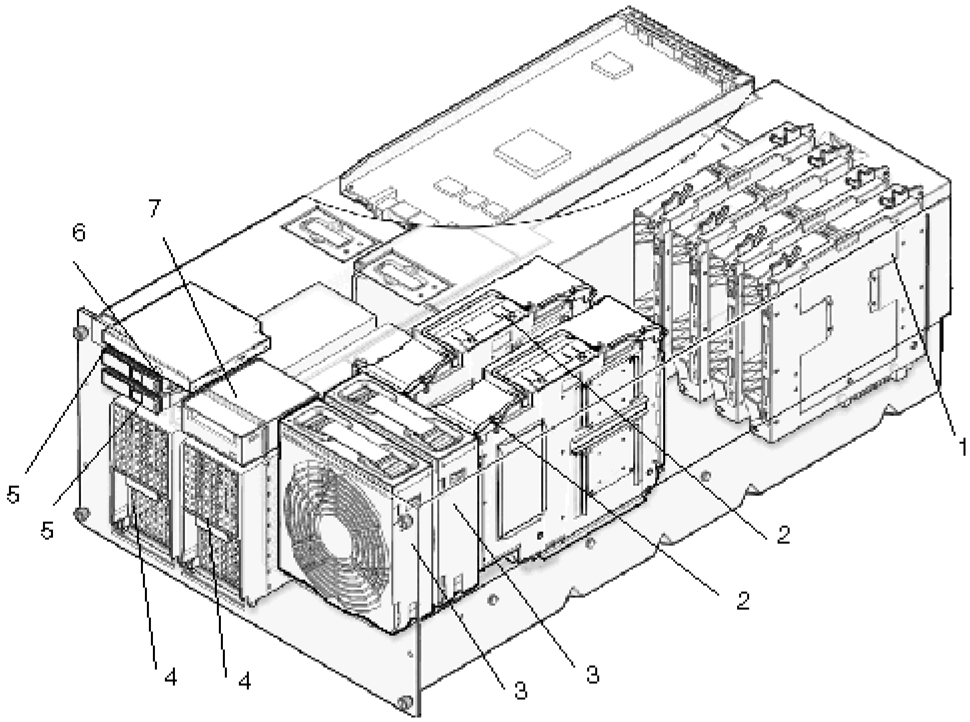
External I/O Units	Maximum of (4) external I/O Units can be configured within the system.	• Each External I/O Expansion Unit houses (1 or 2) PCI-E or PCI-X I/O Boats. • Each I/O Boat has (6) PCI-E or (6) PCI-X slots. • PCI-E and PCI-X I/O Boats can be mixed within an External I/O Expansion Unit. • (1) PCI-E slot in an IOU will be needed for **each** *Optical Link Card* or *Copper Link Card being used to connect the External I/O Expansion Units to the M5000 server.* • *Each I/O Boat contains a seventh slot for the first Optical Link Card or Copper Link Card connection to the internal IOU in the server.* • *(1) Optical Link Card or Copper Link Card is required for each I/O Boat of an External I/O Expansion Unit.* • *Additional Optical Link Cards and Copper Link Cards can be installed in any slot in the IOU.* • *A max of (4) Link Cards are supported in an IOU.*
Extended System Control Facility (XCSF)	Monitoring/Control Faclility	• The XSCF firmware runs on the service processor system. • The board with the installed XCSF firmware is called the XSCFU (XSCF Unit). • The XSCF Unit for the M5000 is physically different than the XSCF Unit for the M8000/M9000. • Manages hardware configuration and health, domain configuration and status, error monitor and notification facility. **XSCF Unit Technical Specs:** • 533-MHz PowerQICC CPU. • 512-MB DRAM main memory. • 1-GB NAND Flash memory. • A version of Embedded Linux operating system.
Internal Disk Drives	Maximum of (4) SAS drives.	• Up to (4) hot-plugable 73GB or 146GB 10K RMP 2.5" SAS Disk Drives. • The qty (2) HDD standard configs comes with 73GB drives only. • The qty (4) HDD standard config comes with the second IOU already and with 73GB drives only. • 146GB drives are supported in the M5000 but they are not currently part of **any** standard configs, thus drives from standard configs (73GB) would have to be removed in the field and replaced with the with x-option 146GB drives. Alternatively, for qty (2) HDD standard configs, an optional second IOU could be added and could house 73GB or 146GB x-option drives.
Internal DVD-ROM	Includes (1) DVD-ROM.	• All M5000 configurations come with (1) DVD-ROM drive.

Internal Tape Drive	Optional DAT Tape Drive.	• Up to (1) DAT Tape Drive can be installed in the M5000.
Internal Floppy Drive	None	
External Ports	**Details**	**Notes**
SCSI	None	
Fibre Channel	None	
Ethernet	(4) Ethernet ports	• (4) integrated 1-Gbit Ethernet ports.
Serial	None	• Legacy SAI/P PCI Adapters can be used in the M5000 PCI-X slot on the I/O Unit or in the optional External I/O Expansion Unit at GA.
XCSFU	See Notes.	**The XSCFU provides several external interfaces for communication including:** • A serial port (RJ-45) that can be used to access the CLI. • Two 10/100 Ethernet ports on which both the CLI and a browser-based interface is available. • USB port that a field engineer can use to download hardware information. • An uninterruptible power control (UPC) port to connect the system to a UPS.
Parallel	None	
USB	None	
Keyboard	None	
Video	None	• The XVR-200 and the Legacy 2D XVR-100 graphics card may be installed for display/visualization only. • The XVR-200 will be supported at GA. • Legacy 2D XVR-100 graphics card can be used in the M5000 PCI-X slot on the I/O Unit or in the optional External I/O Expansion Unit at RR. • XVR-300x8 graphics accelerator, 24-bit color. • The graphics card can not be used as a system console display.
Audio	None	
Other	None	
External Storage	**Details**	
Disk Storage	D240, FLX280, ST2540, 3120, 3320, 3510FC, 3511, 5320 NAS, 6140, 6540, FLX380, 9910, 9960, 9970, 9980, 9985, 9990, EMC Symmetrix	

Tape Storage	DAT 72 Rackmount, LTO3 Rackmount, LTO2V Rackmount, SDLT600 Rackmount, DAT 72 Desktop, DAT 72 USB Desktop, LTO3 Desktop, LTO2 Desktop, LTO2V Desktop, SDLT600 Desktop, SDLT320 Desktop, C2, Legacy STK L20, Legacy STK L40, Legacy STK L80, C4, L180, SL500 (LTO), SL500 (Mixed Media), L700e, L1400M, SL8500
Supported Boot Devices	**Details**
Primary Boot Device	• The (4) internal disks in the M5000. • The M5000 can not boot from any storage attached to an External I/O Unit.
Additional Supported Boot Devices	Sun StorageTek 2540
	Sun StorageTek 6140
	Sun Storage 3120
	Sun StorEdge 3510FC
	Sun StorEdge 9980
	Sun StorEdge 9985
Physical Specs	**Details**
Height	17.3" (440 mm)
Width	17.5" (444.5 mm)
Depth	32.1" (816 mm)
Weight (max)	275 lbs (124.7 kg)
Electrical Specs	**Details**
Input Voltage	100-240 VAC, 47-63Hz
Input Current	48A at 100-127 VAC (12A per cord) 24A at 200-240 VAC (12A per cord 2+2 redundancy)
Power Consumption	4,590W (Max)
BTU's	15,661 BTU/hr max
Rack Info	**Details**
Rack Units	10RU enclosure.
Supported Racks	• The standard power cords included with the M5000 are designed to connect to the Sun Rack 1000-42 with either 60A 3-Phase or 32A 3-Phase MPS power systems ONLY. • No power cords need to be ordered for the M5000 when using the Sun Rack 1000-42 with 60A 3-Phase or 32A 3-Phase MPS power systems. • The M5000 is NOT supported connected to the PDS power option in Sun racks. • Alternate power cords can be specified for use with alternate power sources. • It is recommended to use a rack extention (XRACK-EXTEND38RU) when installing the M4000 and M5000 servers into the Rack 900-38 • 900-36N is supported but not recommended, there is no extender for 900-36N thus the M4K and M5K protrude from the back of the rack. • Sun Rack 900-36N (Support may vary by GEM) • Sun Rack 900-38 (Support may vary by GEM) • Sun Rack 1000-38 • Sun Rack 1000-42 (Recommended)

SPARC Enterprise M4000 Server

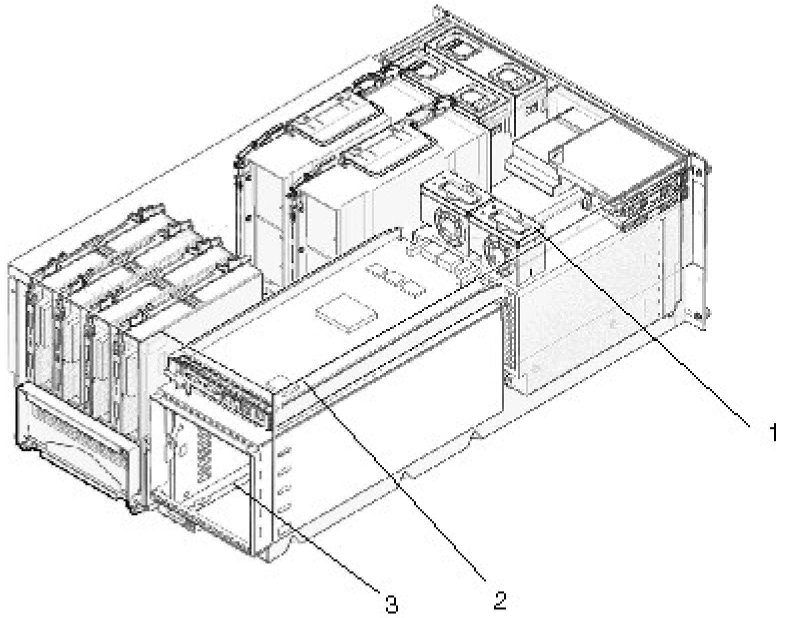
SPARC Enterprise M4000 Server (Internal Front View)



Callout Number	Component	Maximum Number per Server
1	Memory boards	4
2	CPU modules each containing two processor chips	2
3	172 mm fans	2
4	Power supply units	2

Callout Number	Component	Maximum Number per Server
5	Hard disk drives, Serial-attached SCSI	2
6	DVD drive	1
7	Tape drive unit (DAT), optional	1

SPARC Enterprise M4000 Server (Internal Rear View)

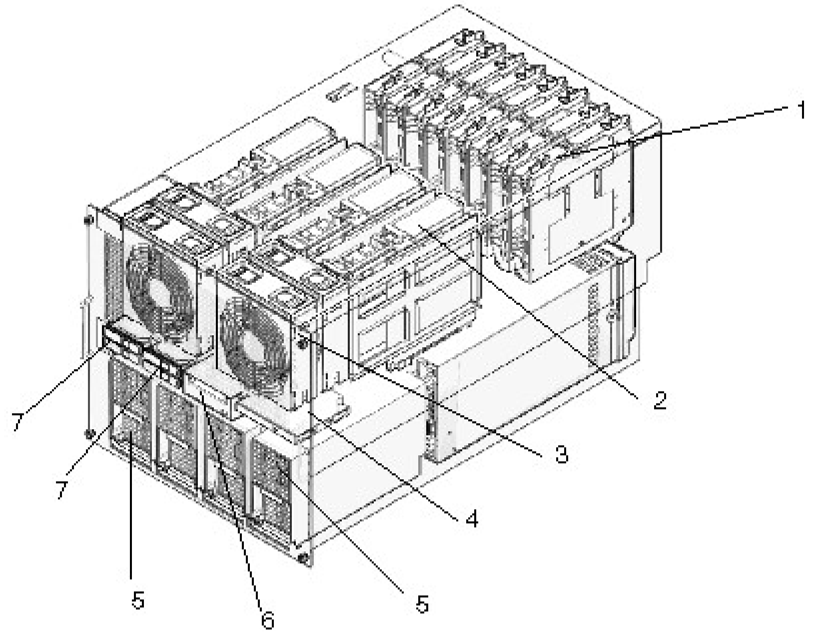


Callout Number	Component	Maximum Number
1	60 mm fans	2
2	eXtended System Control Facility Unit (XSCFU)	1
3	I/O unit--supports one PCI-X slot (lowest slot) and four PCIe slots (four upper slots)	1

SPARC Enterprise M5000 Server

The SPARC Enterprise M5000 server is a ten-rack unit (10 RU) enclosure (17.25 inches, 438 mm), which supports up to four dynamic server domains.

SPARC Enterprise M5000 Server (Internal Front View)

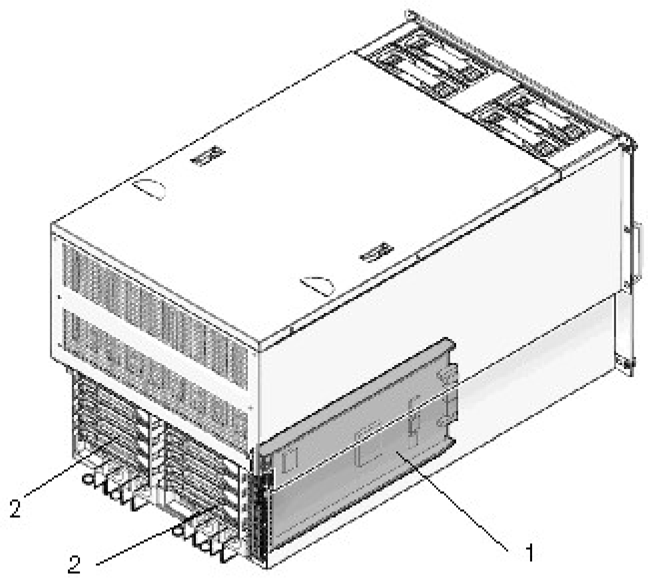


Internal front view of the M5000 server.

Callout Number	Component	Maximum Number
1	Memory boards	8
2	CPU modules each containing two processor chips	4
3	172 mm fans	4
4	DVD drive	1

Callout Number	Component	Maximum Number
5	Power supply units	4
6	Tape drive unit (DAT), optional	1
7	Hard disk drives, Serial-attached SCSI (SAS)	4

SPARC Enterprise M5000 Server (Rear View)



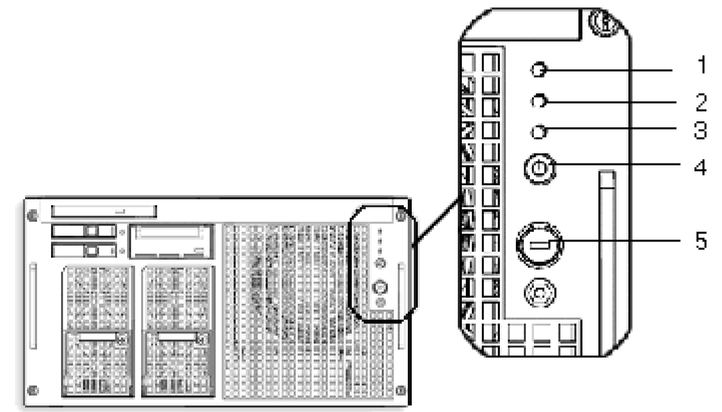
Rear view of the SPARC Enterprise M5000 server

Callout Number	Component	Maximum Number
1	eXtended System Control Facility Unit (XSCFU)	1
2	I/O unit Each I/O unit supports one PCI-X slot (lowest slot) and four PCIe slots (four upper slots)	2

Operator Panel Overview

The operator panel, which is identical for both midrange servers is located on the front of the server, in the upper right corner () The operator panel is used for the following tasks:

- Displaying the server status
- Storing server identification information
- Storing user setting information
- Turning on the power supply of all domains
- Changing operational and maintenance mode by using the mode switch



	Function
1	Power LED
2	XSCF STANDBY LED
3	Check LED
4	POWER button
5	Mode switch (keyswitch)

During startup, the front panel LED status indicators are individually toggled on and off to verify that each component is working correctly. After startup, the front panel LED status indicators operate as described in following table.

Operator Panel LEDs and MODE Switch

Icon	Name	Color	Description
	Power LED	Green	Indicates the server power status. • On: Server has power. • Off: Server is without power.
	XSCF Standby LED	Green	Indicates the readiness of the XSCF . • On: XSCF Unit is functioning normally. • Off: XSCF Unit is stopped. • Blinking: Under system initialization after NFB on, or under system power-on process.
	Check LED	Amber	Indicates that server detected a fault. • On: Error detected that disables the startup. • Off: Normal, or the breaker is off (power failure). • Blinking: Indicates the position of fault.
	Power button		Button to direct server power on/power off.
	Mode switch (keyswitch)		The Locked setting: • Normal key position. Poweron is available with the Power button, but power off is not. • Disables the Power button to prevent unauthorized users from powering the server on or off. • The Locked position is the recommended setting for normal day-to-day operations.
			The Service setting: • Service should be provided at this position. • Power on and off is available with Power button. • The key cannot be pulled out at this position. • Because remote power control and automatic power control of the server are disabled in Service mode, unintentional power-on can be prevented.

The combination of the LED status indicators show server status.

Status Indicator LED Pattern Summary

Indication	Status		XSCF Standby	
		POWER	XSCF Ready	Check
Status transition	External circuit breaker off	Off	Off	Off
Status transition	External circuit breaker on	Off	Off	On
Status transition	XSCF initialization	Off	Blink	Off
Status transition	Error detection by the XSCF self check	Off	Off	On
Status transition	Standby (waiting for the operator to power the server on)	Off	On	Off
Status transition	Waiting for air conditioner power on	Off	On	Off
Status transition	Warm up (in case that delayed power on configured)	On	On	Off
Status transition	Power on sequential process (each domain starts the operation)	On	On	Off

Indication	Status		XSCF Standby	
		POWER	XSCF Ready	Check
Status transition	In operation	On	On	Off
Status transition	Operator issued an order to power the server off	Blink	On	Off
Fault indication	Server is suspended due to error detection	Off	On	On
Fault indication	Locator/server location indication	Any	On	Blink

Components

Components that are removed using "hot FRU removal" can be removed from the server and replaced while the operating server is running without performing a dynamic reconfiguration operation. Components that are removed using "active FRU removal" must be dynamically reconfigured out of the domain before removing the component.

There are three basic methods for replacing FRUs from the MX000 servers, these are:

- *Hot-FRU replacement* – Uses the XSCF replacefru command to power down the component. Hot-FRU removal is used for components not used by the Solaris OS domains.
- *Active-FRU replacement* – Uses dynamic reconfiguration (DR) to remove an active component. Active-FRU removal is used for components that are used by the Solaris OS domain to avoid disrupting the domain during the removal and replacement procedures.
- *Cold-FRU replacement* – Powers the system off and unplugs the power cables from the input power source. Cold-FRU removal is used when the component cannot be safely removed while the system is powered on

.

Note – The replacefru command along with Hot-FRU removal, and Active-FRU removal are described in detail later in the course. In this module, you remove and install all components with power turned off.

Sun SPARC Enterprise M4000/M5000				
FRU	Description	Cold	Hot	Active
MBU_A	Motherboard Unit (M4000)	Yes	No	No
MBU_B	Motherboard Unit (M5000)	Yes	No	No
DDC_A	DC-DC Converter (Motherboard and IO Unit)	Yes	No	No
DDC_B	DC-DC Converter with metal heatsink (Motherboard and IO Unit)	Yes	No	No
CMU_A	CPU Module Unit	Yes	No	No
MEMB	Memory Board	Yes	No	No
DIMM	Main Memory DIMM (1, 2, or 4GB)	Yes	No	No
XSCFU	eXtended System Control Facility Unit	Yes	No	No
IOU	I/O Unit	Yes	No	No
DDCR	I/O DC Riser	Yes	No	No
PCIC	PCI Cassette (including PCI card)	Yes	No	Yes
FAN_A	172mm Fans	Yes	Yes, One unit at a time to support redundancy	No
FAN_B	60mm Fan (M4000)	Yes	Yes, One unit at a time to	No

			support redundancy	
FANBP_A	172mm Fan Backplane (M4000)	Yes	No	No
FANBP_B	60mm Fan Backplane (M4000)	Yes	No	No
FANBP_C	172mm Fan Backplane (M5000)	Yes	No	No
PSU	Power Supply Unit	Yes	Yes, One unit at a time to support redundancy	No
BPU_A	I/O Backplane / Power Backplane (M4000)	Yes	No	No
BPU_B	Bus Bar / I/O Backplane / Power Backplane (M5000)	Yes	No	No
HDD	73GB Hard Disk Drive	Yes	No	Yes
HDDBP	Hard Disk Drive backplane	Yes	No	No
TAPE	DAT Tape Drive (Optional)	Yes	No	Yes
TAPEBP	DAT Tape Drive Backplane	Yes	No	No
DVD	DVD Drive	Yes	No	No
DVDBP_A	DVD Drive Backplane (M4000)	Yes	No	No
DVDBP_B	DVD Drive Backplane (M5000)	Yes	No	No
OPNL	Operator Panel	Yes	No	No

The information in the table above comes from the *Sun™ SPARC® Enterprise M4000/M5000 Servers Service Manual, Appendix C*.

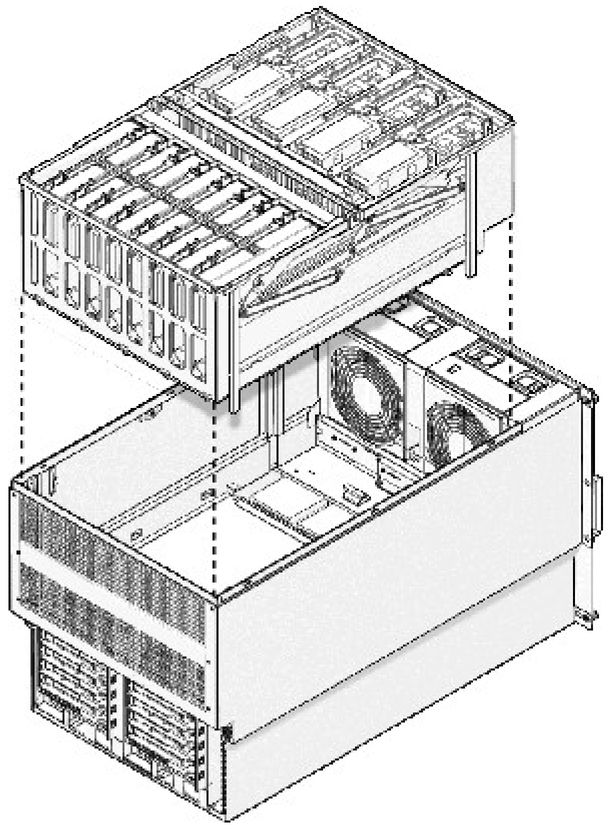
Motherboard Unit

The motherboard unit is the main circuit board in both midrange servers. The following components connect to the motherboard unit:

- CPU modules (two CPU chips per module)
- Memory boards
- Bus bar, I/O backplane, and power backplane unit (SPARC Enterprise M5000 server only)
- I/O unit(s) through the I/O backplane
- eXtended System Control Facility Unit (XSCFU) through the bus bar, I/O backplane, and power backplane unit

To remove and replace the motherboard and these components, you must power the server off.

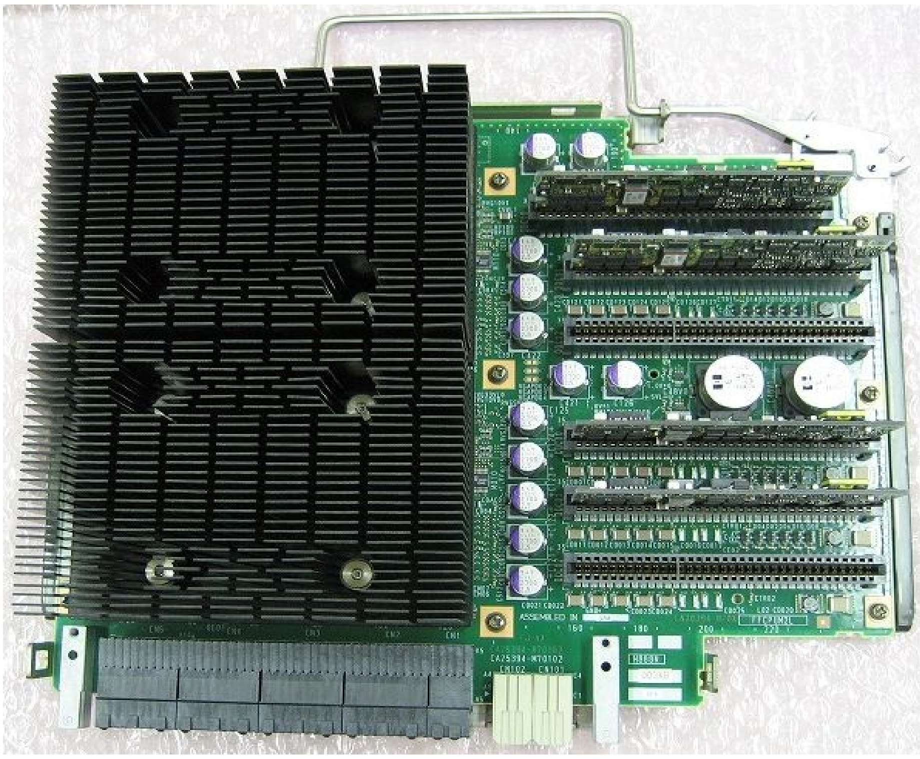
Removing the Motherboard Assembly From the SPARC Enterprise M5000 Server



CPU Module

Each CPU module contains two SPARC64 VI processor chips. Each processor chip incorporates and implements the following:

- Chip multithreading (CMT) design that sequentially executes the multiple processes on the CPU
- Dual core processors per CPU module (with four CPU modules there are eight processors and sixteen cores)

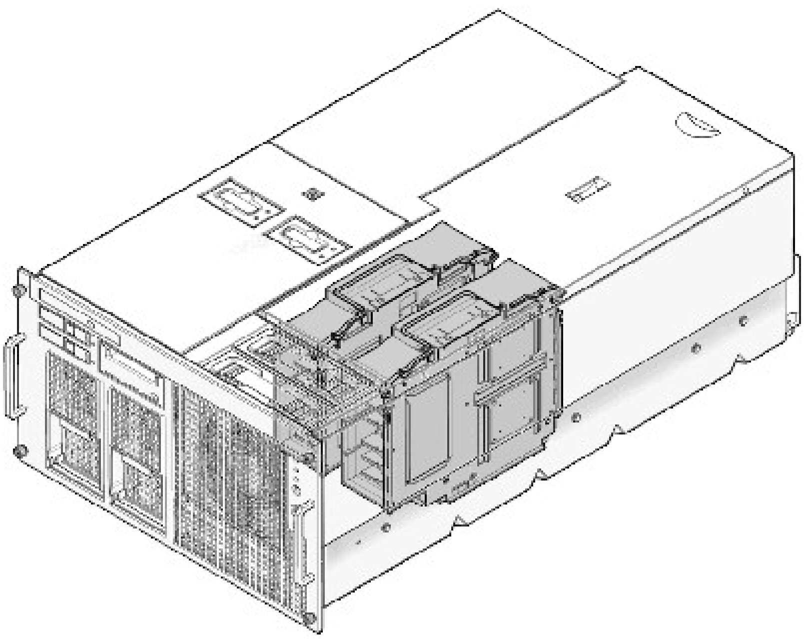


The CPU modules can be accessed from the top of the midrange server.

CPU Module Features

Number of cores per CPU	2
CPU module location	Top of server
Cold FRU replacement capability	Yes

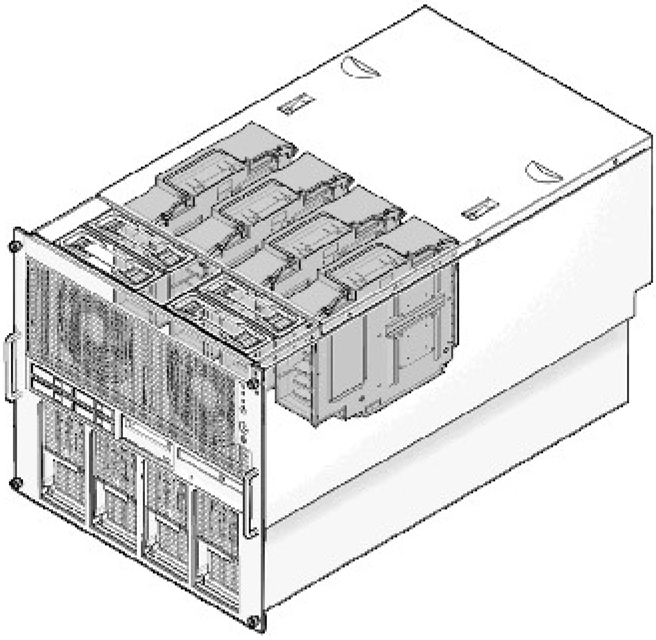
CPU Modules in the SPARC Enterprise M4000 Server



The CPUM are cold-FRU removal components. The M4000 server contains two CPUMs:

- CPUM 0
- CPUM 1

CPU Modules in the SPARC Enterprise M5000 Server

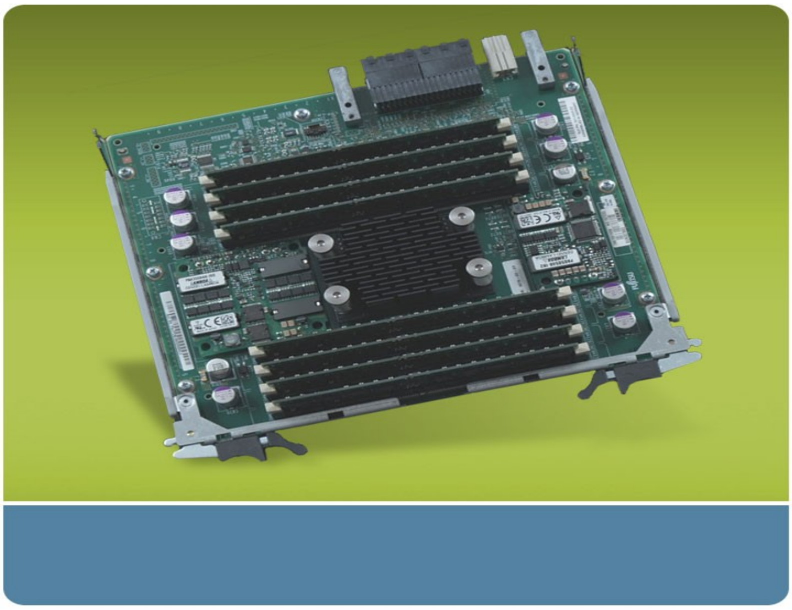


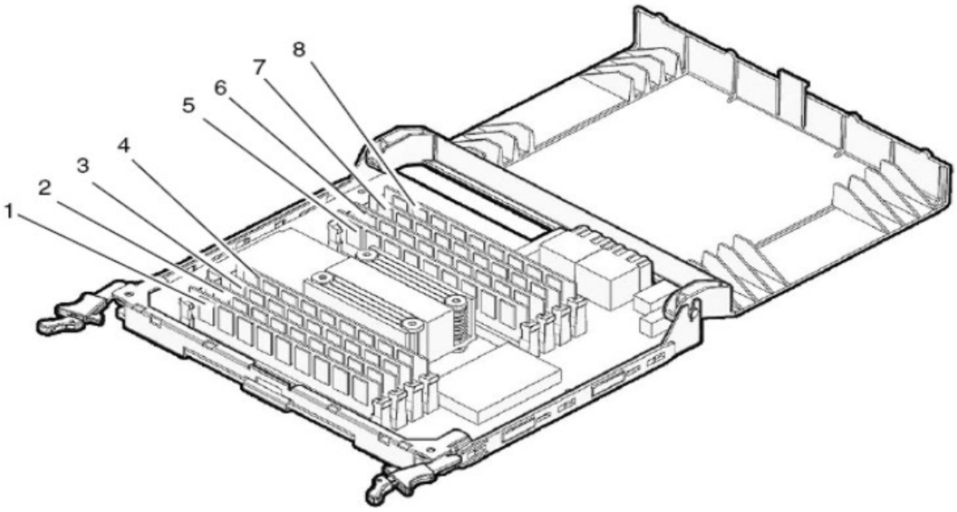
The M5000 server contains four CPUMs:

- CPUM 0
- CPUM 1
- CPUM 2
- CPUM 3

Memory Board

Each memory board provides a memory access controller (MAC) and eight DIMM slots. To remove or install memory boards, you must power the server off.





Location Number	Component
1	MEM#2A, Memory Slot (Group A)
2	MEM#2B, Memory Slot (Group B)
3	MEM#3A, Memory Slot (Group A)
4	MEM#3B, Memory Slot (Group B)
5	MEM#1B, Memory Slot (Group B)
6	MEM#1A, Memory Slot (Group A)
7	MEM#0B, Memory Slot (Group B)
8	MEM#0A, Memory Slot (Group A)

Memory Board Features

Location	Top of server
Cold FRU replacement capability	Yes

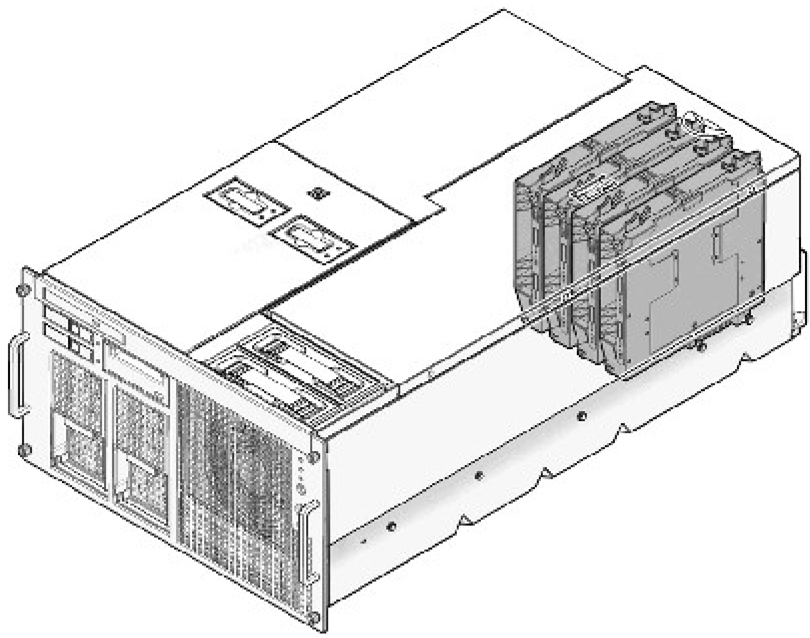
To install DIMMs, you must remove the memory board and open the case of the memory board. The servers use Double Data Rate II (DDR-II) type memory with the following features:

- ECC error protection
- Recovery from memory chip failures
- Memory Mirroring

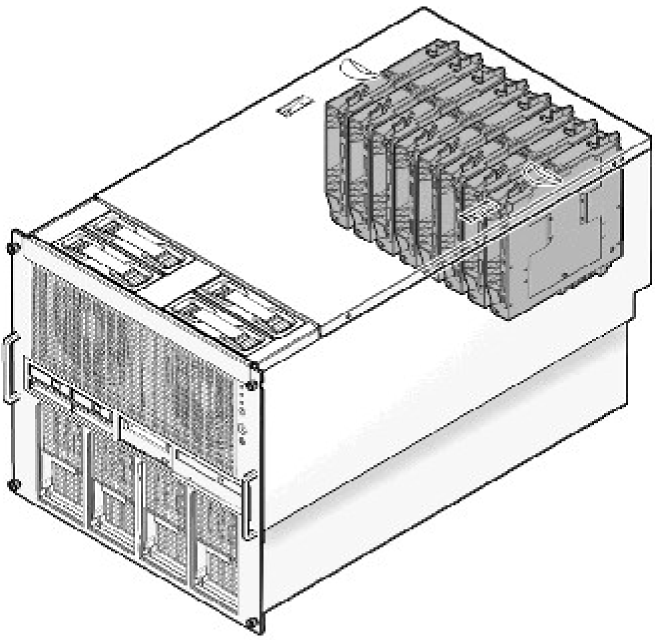
Each memory board provides a MAC and eight DIMM slots. The MEMB are cold-FRU removal components. To remove or install memory boards, you must power the system off.

Feature	M4000 Server	M5000 Server
Number of memory boards	4	8
Board abbreviations	MEMB 0 MEMB 1 MEMB 2 MEMB 3	MEMB 0 MEMB 1 MEMB 2 MEMB 3 MEMB 4 MEMB 5 MEMB 6 MEMB 7
Number of DIMMs	32 (8 DIMMs per memory board	64 (8 DIMMs per memory board

Memory Board Location in the SPARC Enterprise M4000 Server



Memory Board Location in the SPARC Enterprise M5000 Server



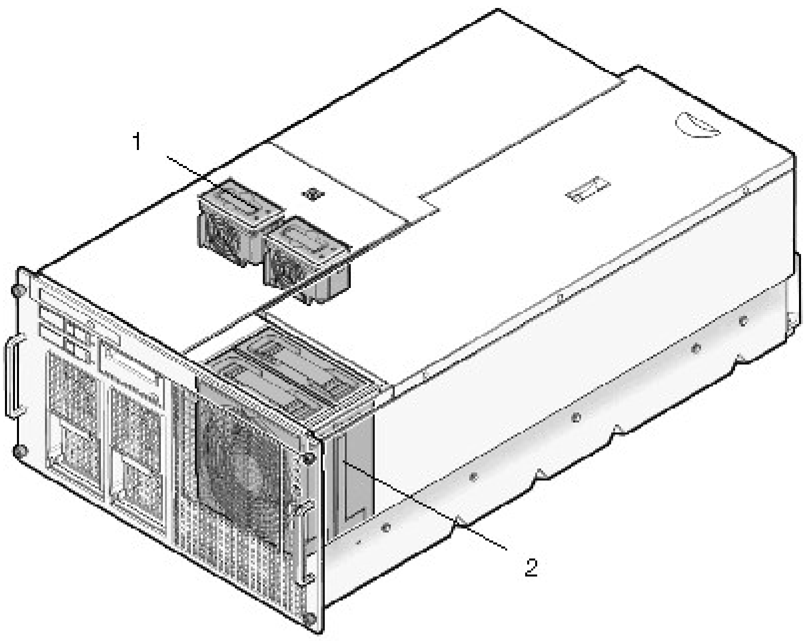
Fan

Both midrange servers use 172-mm fans as the primary cooling system.

The fans in both midrange servers move air currents into and out of the server. The fans in both midrange servers are redundant. Because of the redundancy, system operation continues when a failure occurs with one fan. If the midrange server has at two fans of each fan type, one fan of each fan type is redundant. If the midrange server has a total of four fans, two of the four fans are redundant. Fan failures can be detected by the eXtended System Control Facility (XSCF).

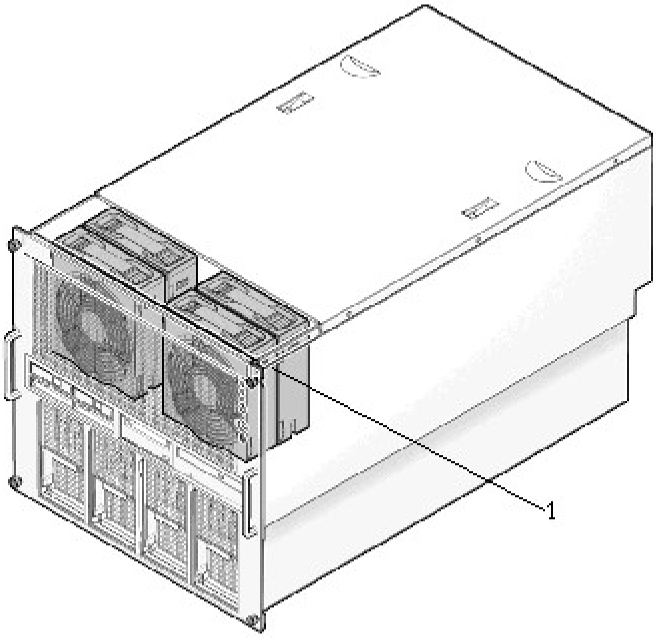
The fans are accessed from the top of the midrange server.

Fan Locations in the SPARC Enterprise M4000 Server.



Callout Number	Description
1	Fans (2), 60-mm
2	Fans, 172-mm (M4000-2, M5000-4)

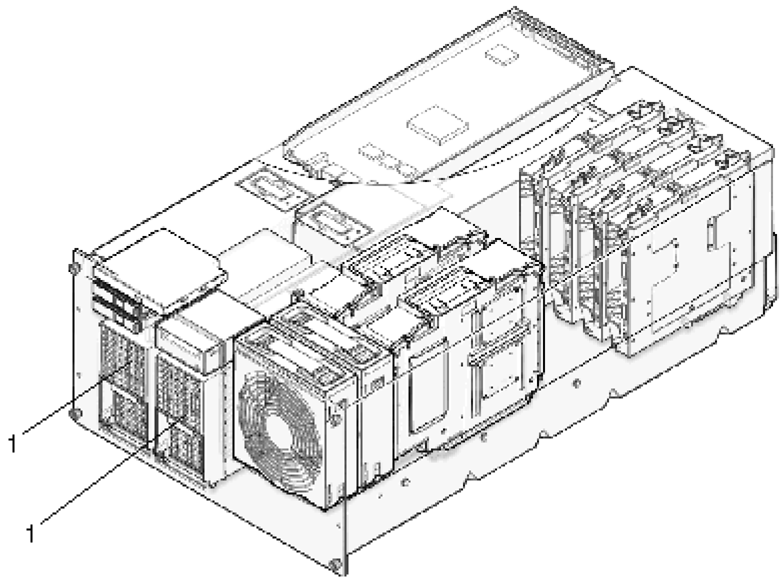
Fan Locations in the SPARC Enterprise M5000 Server.



Callout Number	Description
1	Fans, 172-mm (M4000-2, M5000-4)

Power Supply

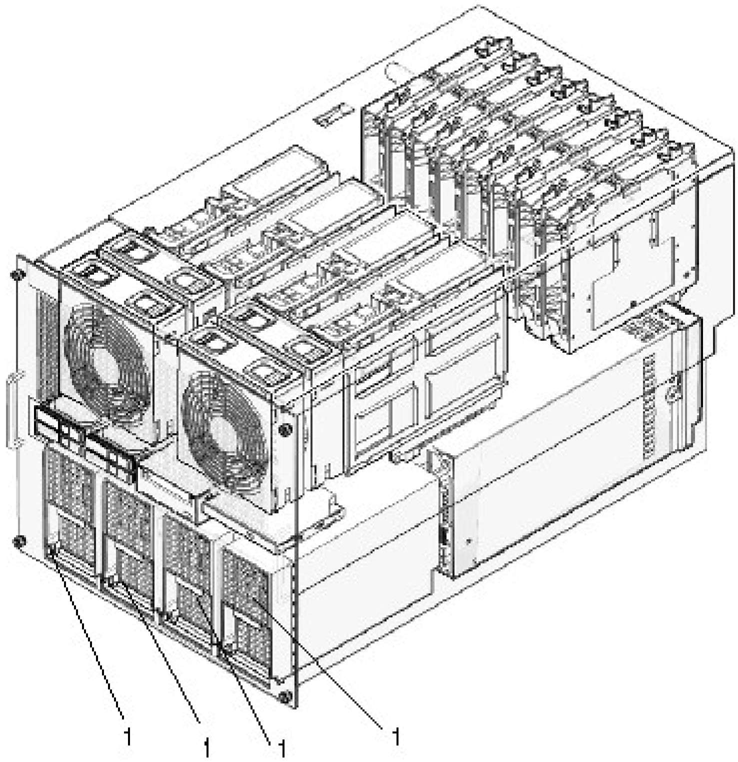
Power is provided to both midrange servers by power supply units.



Power Supply Units in the SPARC Enterprise M4000 Server.

Callout Number	Description
1	Power supply units

Power Supply Units in the SPARC Enterprise M5000 Server.



Callout Number	Description
1	Power supply units

The redundant power supplies allow continued server operation if a power supply fails. If the system has two power supplies, one power supply is redundant and two power cords are required for redundancy. If the system has four power supply units, two power supply units are redundant and four power cords are required for redundancy. There is one power cord per power supply unit.

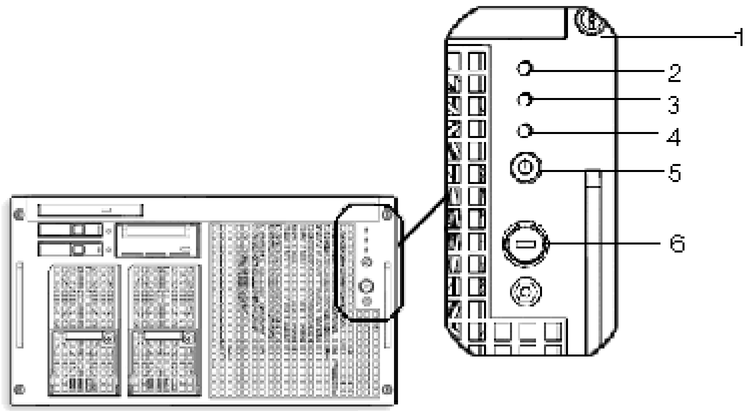
You can remove a power supply while the domain is operating (hot FRU removal).

Power Supply Features

SPARC Enterprise M5000 Server	
Hot FRU removal/replacement capability	Yes (from front)
Redundant AC input	Yes
Input Current--Voltage Range	100-240 VAC
Input Current (maximum)	23.4A at 200 VAC (11.7A/cord)
Input Current--Frequency Range	50/60 Hz
Power Factor	0.98

Operator Panel

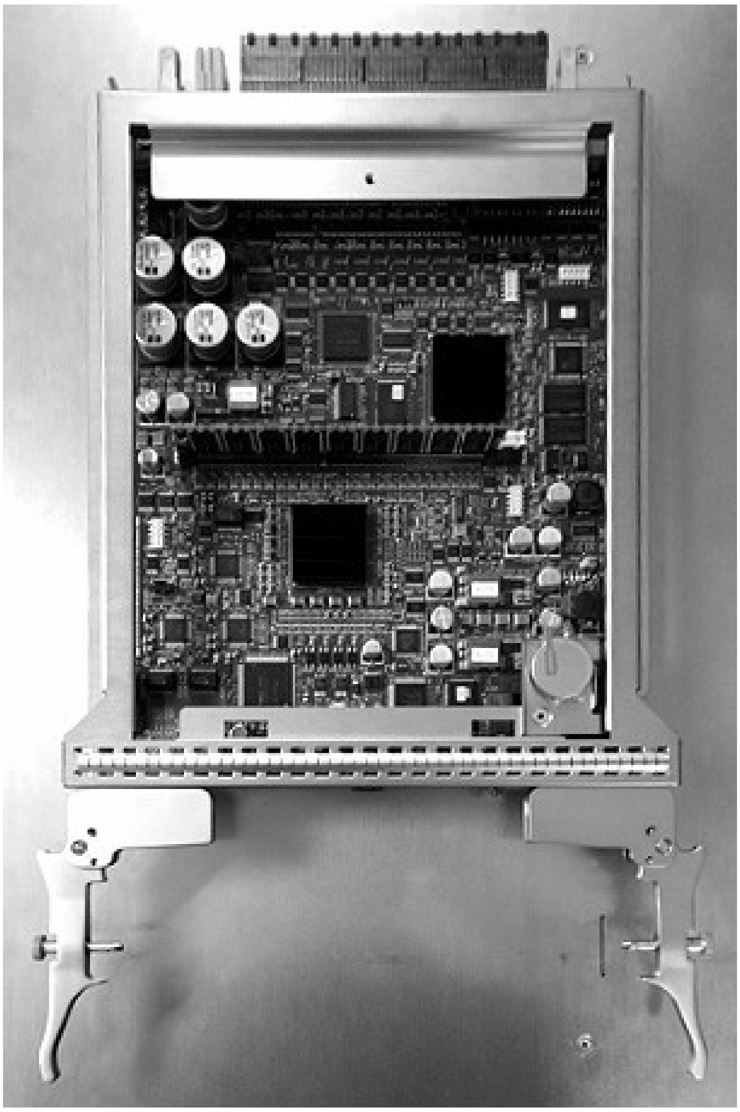
The operator panel, which is not redundant, displays the system status, system problem alerts, and location of system faults. It also stores the system identification and user setting information.



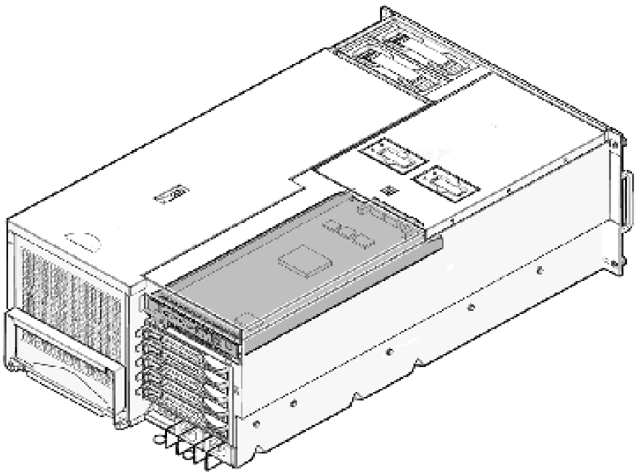
Callout Number	Function
1	Operator panel (FRU)
2	Power LED
3	Standby LED
4	Check LED
5	POWER button
6	MODE switch

eXtended System Control Facility Unit (XSCFU)

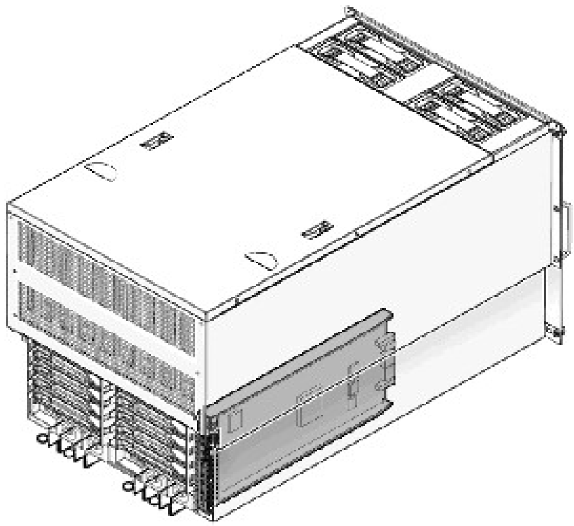
The eXtended System Control Facility Unit (XSCFU) is a service processor that operates and administrates both midrange servers. The XSCFU diagnoses and starts the entire server, configures domains, offers dynamic reconfiguration, as well as detects and notifies various failures. The XSCFU enables standard control and monitoring function through network. Using this function enables starts, settings, and operation managements of the server from remote locations.



XSCFU Location in the SPARC Enterprise M4000 Server



XSCFU Location in the SPARC Enterprise M5000 Server



The XSCFU uses the eXtended System Control Facility (XSCF) firmware to provide the following functions:

- Controls and monitors the main unit hardware
- Monitors the Solaris OS, power-on self-test (POST), and the OpenBoot PROM
- Controls and manages the interface for the system administrator (such as a terminal console)
- Administrators device information
- Controls remote messaging of various events

Both midrange servers have one XSCFU, which is serviced from the rear of the server. To replace it, you must power off the server. For more information, refer to the SPARC Enterprise M4000/M5000 Servers Service Manual.

The XSCF firmware provides the system control and monitoring interfaces listed below.

- Serial port through which the command line interface (XSCF shell) can be used
- Two LAN ports:
    - XSCF shell
    - XSCF Web (browser-based user interface)

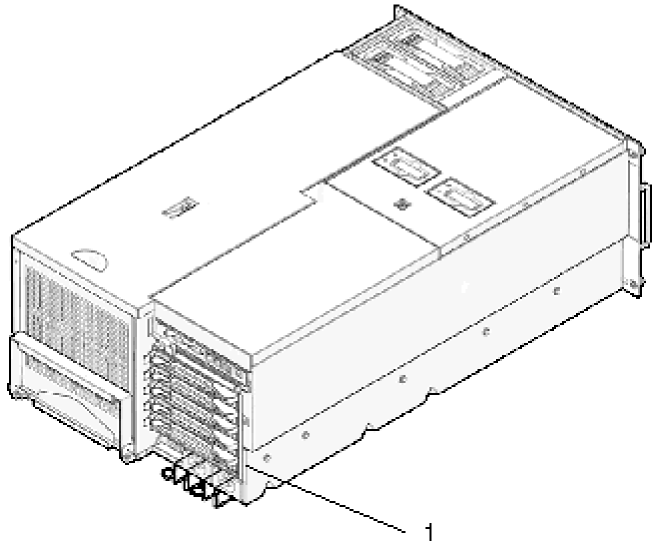
The following additional interfaces for system control are also provided:

- The uninterruptible power supply unit (UPC) interface ports (2), which are used to communicate to uninterruptible power supply units (UPS)
- RCI port, which is used for power supply synchronization through a connected remote cabinet interface (RCI) device
- USB interface port for maintenance operator
    - This is dedicated for use by field engineers and cannot be connected to general-purpose USB devices.

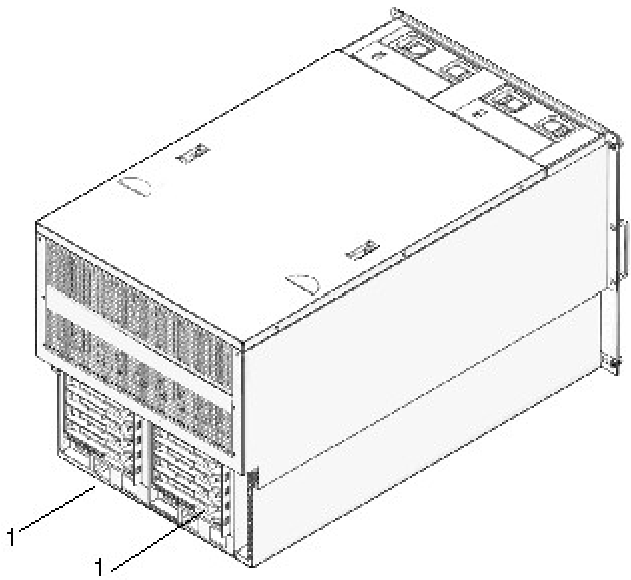
I/O Unit

Four PCI Express (PCIe) buses are connected from one I/O controller. These buses support all of the systems on-board I/O controllers in addition to the interface cards in the server.

I/O unit in the M4000 server



I/O Unit Locations in the SPARC Enterprise M5000 Server.



Callout Number	Description
1	I/O unit

The I/O unit (IOU) is used in the both midrange servers.

The IOU houses the following:

- Four PCIe 8lane, x8 short card slots (four upper slots)
- One PCI-X short card slot (lowest slot)

The IOU holds cassettes that supports both PCIe and PCI-X cards.

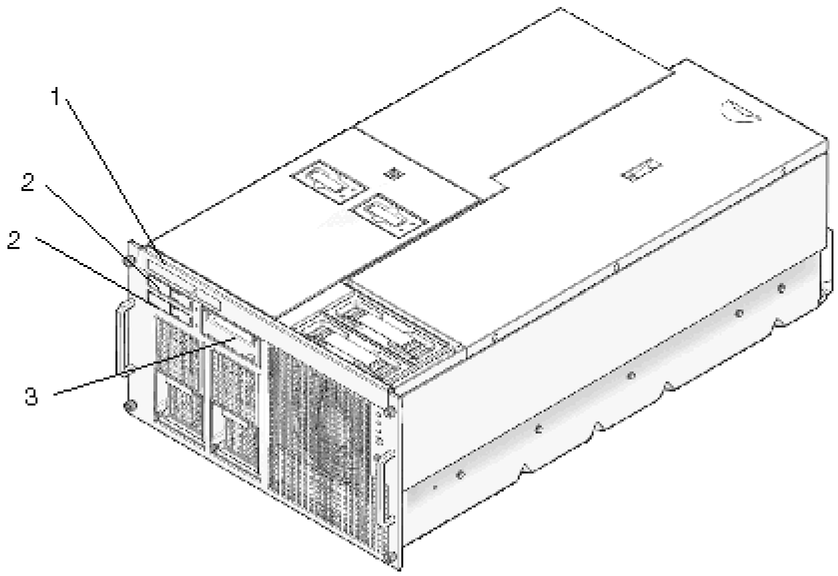
The PCIe features include a high-speed serial point-to-point interconnect. Compared with conventional PCI buses, the PCIe data transfer rates are doubled. PCI-X is the current PCI standard.

On-Board Drive Units

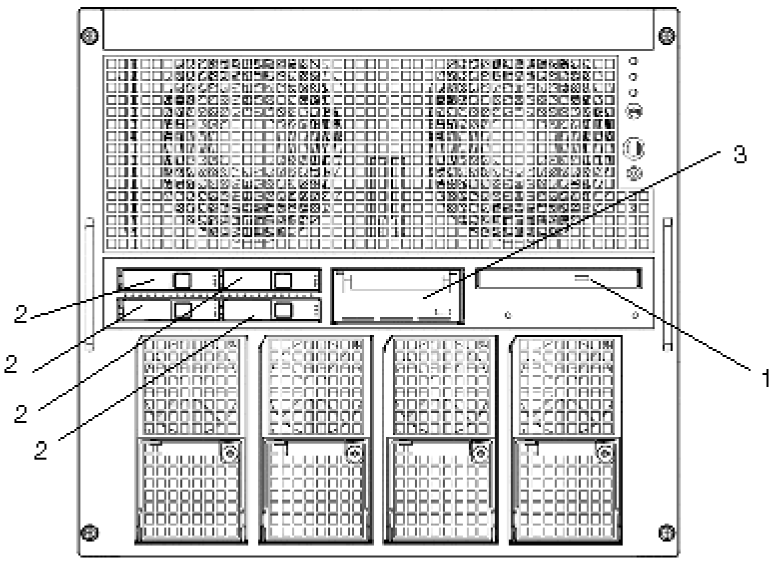
Both midrange servers provide front-panel access to the drives. The following drives are provided on both midrange servers:

- Hard disk drive units
- One tape drive unit (optional)
- One DVD drive unit

Hard Disk Drive, Tape Drive, and DVD Drive Units in the SPARC Enterprise M4000 Server



Callout Number	Description
1	DVD drive
2	Hard disk drive
3	Tape drive



Hard Disk Drive, Tape Drive, and DVD Drive Units in the SPARC Enterprise M5000 Server Figure noting the location of the hard disk drive, tape drive, and DVD drive in the SPARC Enterprise M5000 server

Callout Number	Description
1	DVD drive
2	Hard disk drive
3	Tape drive

Hard Disk Drive

The hard disk drives are located on the front of the midrange server. The SAS interface on the hard disk drive allows a faster data transmission rate.

DVD Drive

DVD Drive Features and Specifications for Both Servers

Number of DVD drives	1
Location	Front of server to the right of the disk drives
Hot FRU replacement	No

The Advanced Technology Attachment Packet Interface (ATAPI) is an interface between the server and the DVD drive unit.

Tape Drive Unit

The tape drive unit in both midrange servers is an optional components.

Tape Drive Unit Features and Specifications for Both Midrange Servers

Feature	Quantity, Location, and Specifications
Number of tape drive units	1 (optional)
Location	Front of server
Active FRU replacement capability	Yes
Tape drive unit type	Digital audio tape (DAT) drive
Data transfer rate	About 6 MB/s
Capacity	36 Gbytes of data (non compressed format) 72 Gbytes of data (double-compressed format)
Media type	Sequential access
Transfer rate	150 MB/s or faster

I/O Options

External I/O Expansion Unit

You can purchase an optional External I/O Expansion Unit to add I/O capacity to the server.

For installation and service of the unit see the Sun External I/O Expansion Unit Installation and Service Manual 819-1141-xx at docs.sun.com

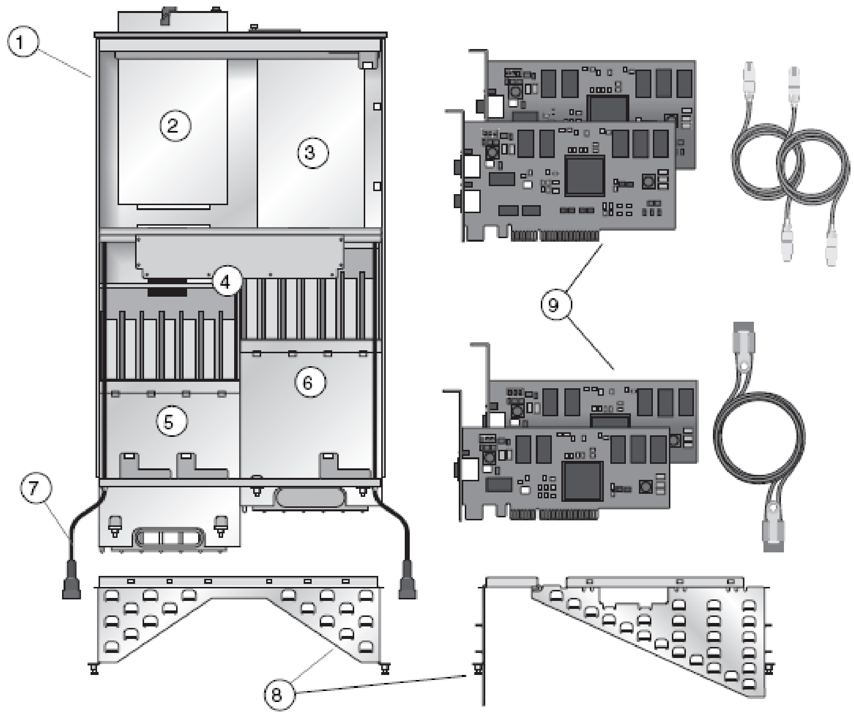


FIGURE 1-2 Major Units for the External I/O Expansion Unit, Top View

Item	Description	Item	Description
1	Chassis	6	I/O boat1
2	Power Supply Unit 1	7	Internal AC cable
3	Power Supply Unit 0	8	Cable management unit (one of two types is available)
4	Centerplane	9	Optical link kit or Copper link kit (two types are available)
5	I/O boat0		

PCI Cards

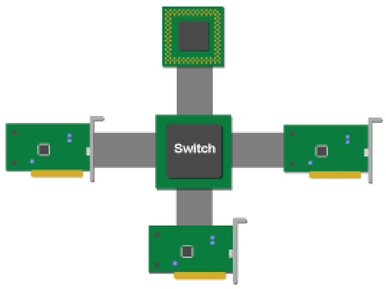
Each PCI card in the server must be mounted to a PCI cassette before the card can be inserted into the I/O unit slot.

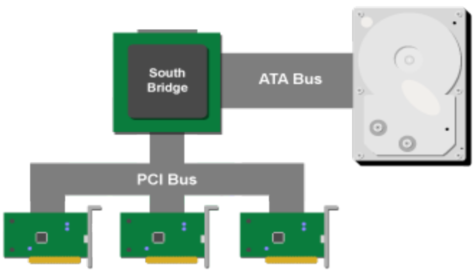
Technology	BUS SPEED	BUS WIDTH	BANDWIDTH	Comments
PCI				Shared bus
	33MHz	32 bit	133 MB/s	
	33MHz	64 bit	266 MB/s	
	66MHz	32 bit	266 MB/s	
	66MHz	64 bit	532 MB/s	
PCI-X				Shared bus
	66MHz	64 bit	512 MB/s	
	100MHz	64 bit	800MB/s	
	133MHz	64 bit	1GB/s	
	266MHz	64 bit	2GB/s	
PCI Express				Switched point to point
		X1	4Gbps (500 MB/s)	
		X2	8Gbps (1GBps)	
		X4	16Gbps (2GBps)	
		X8	32Gbps (4GBps)	
		X12	48Gbps (6GBps)	
		X16	64Gbps (8GBps)	
		X32	128Gbps (16GBps)	

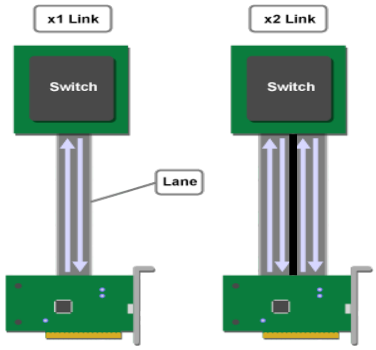
PCI Cassette

PCI Shared Bus

PCI EXPRESS Point2Point







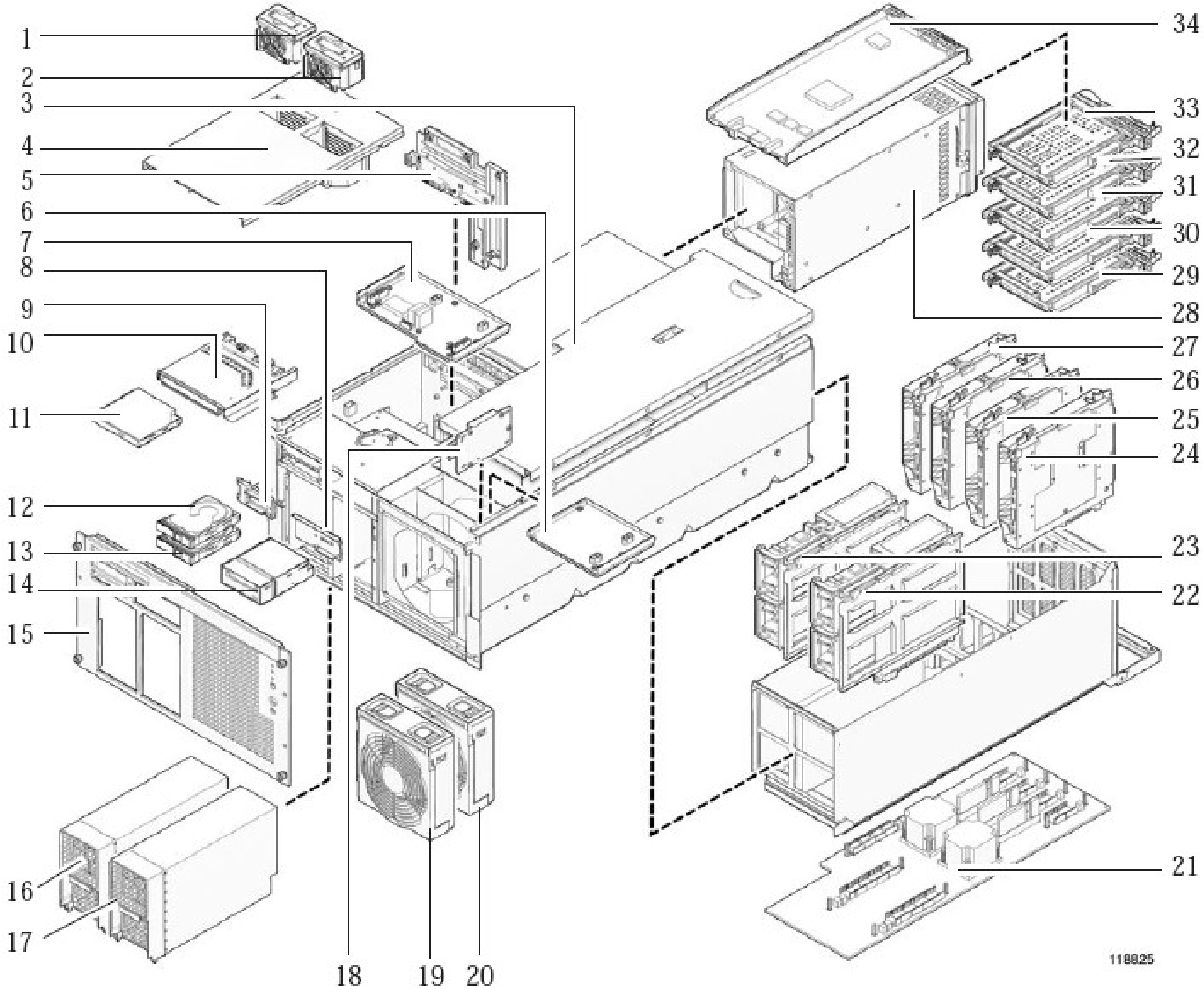
Software Features

The Solaris Operating System (Solaris OS) is installed on the system domains. In addition to its suite of software capabilities, Solaris OS provides functions that interact with system hardware.

- Dynamic Reconfiguration
- Solaris zones
- PCI hot-plug
- Capacity on Demand

Both midrange servers use the eXtended System Control Facility (XSCF) firmware. This firmware runs on the service processor and provides control and monitoring functions for the system platform.

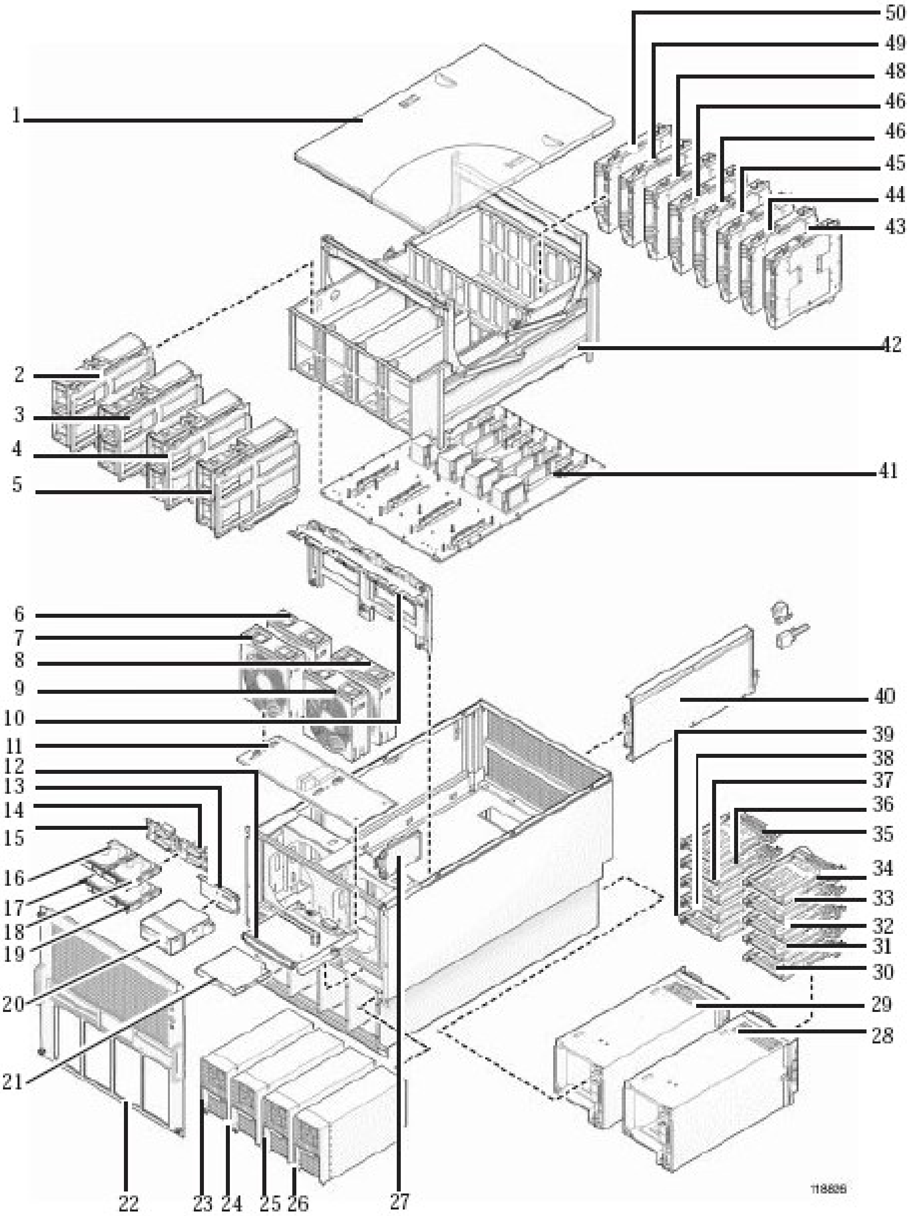
M4000 Server Components



Location Number	Component	Part Name/Number
1	60-mm fan	FAN_B 0
2	60-mm fan	FAN_B 1
3	Top cover	
4	Fan cover	
5	Backplane unit	BPU_A
6	172-mm fan backplane	FANBP_A
7	60-mm fan backplane	FANBP_B
8	DAT tape backplane	TAPEBP
9	Hard drive backplane	HDDBP
10	DVD backplane	DVDBP_A
11	DVD drive	DVD
12	Hard disk drive	HDD 1
13	Hard disk drive	HDD 0
14	DAT tape drive	TAPE
15	Faceplate	
16	Power supply unit 48v	PSU 0
17	Power supply unit 48v	PSU 1
18	Operator panel	OPNL
19	172-mm fan module	FAN_A 0
20	172-mm fan module	FAN_A 1
21	Motherboard unit	MBU_A
22	CPU module	CPUM 1
23	CPU module	CPUM 0
24	Memory board	MEMB 3

Location Number	Component	Part Name/Number
25	Memory board	MEMB 2
26	Memory board	MEMB 1
27	Memory board	MEMB 0
28	I/O unit	IOU 0
29	PCI cassette	IOU 0 PCI 0
30	PCI cassette	IOU 0 PCI 1
31	PCI cassette	IOU 0 PCI 2
32	PCI cassette	IOU 0 PCI 3
33	PCI cassette	IOU 0 PCI 4
34	Extended System Control Facility Unit	XSCFU

M5000 Server Components



Location Number	Component	Part Name/Number
1	Top cover	
2	CPU module	CPUM 0
3	CPU module	CPUM 1
4	CPU module	CPUM 2
5	CPU module	CPUM 3
6	172-mm fan	FAN_A 1
7	172-mm fan	FAN_A 0
8	172-mm fan	FAN_A 3
9	172-mm fan	FAN_A 2
10	Backplane unit	BPU_B
11	172-mm fan backplane	FANBP_A
12	DVD backplane	DVDBP_A
13	DAT tape backplane	TAPEBP
14	Hard disk drive backplane	HDDBP 1 IOU 1
15	Hard disk drive backplane	HDDBP 0 IOU 0
16	Hard disk drive	IOU 0 HDD 1
17	Hard disk drive	IOU 1 HDD 0
18	Hard disk drive	IOU 0 HDD 3
19	Hard disk drive	IOU 1 HDD 2
20	DAT tape drive	TAPE
21	DVD drive	DVD
22	Faceplate	
23	Power Supply Unit	PSU 0
24	Power Supply Unit	PSU 1

Location Number	Component	Part Name/Number
25	Power Supply Unit	PSU 2
26	Power Supply Unit	PSU 3
27	Operator panel	OPNL
28	I/O unit	IOU 1
29	I/O unit	IOU 0
30	PCI cassette	IOU 1 PCI 0
31	PCI cassette	IOU 1 PCI 1
32	PCI cassette	IOU 1 PCI 2
33	PCI cassette	IOU 1 PCI 3
34	PCI cassette	IOU 1 PCI 4
35	PCI cassette	IOU 0 PCI 4
36	PCI cassette	IOU 0 PCI 3
37	PCI cassette	IOU 0 PCI 2
38	PCI cassette	IOU 0 PCI 1
39	PCI cassette	IOU 0 PCI 0
40	Extended system control facility unit	XSCFU
41	Motherboard unit	MBU_B
42	Motherboard carriage	
43	Memory board	MEMB 7
44	Memory board	MEMB 6
45	Memory board	MEMB 5
46	Memory board	MEMB 4
47	Memory board	MEMB 3
48	Memory board	MEMB 2
49	Memory board	MEMB 1
50	Memory board	MEMB 0

M8000/M9000 Product Overview

SPARC Enterprise M8000/M9000 servers have been developed as UNIX servers using a symmetric multi-processing (SMP) architecture. Each of these systems merges mainframe technologies for high reliability, and the associated know-how accumulated over time, with the high-speed technologies of super computers and the openness of UNIX server development.

If a problem occurs during operation, the errors causing them can be corrected or isolated without stopping the system. This feature minimizes problems in many cases, thereby improving job continuity.

Each SPARC Enterprise M8000/M9000 Servers contains one or more SPARC64 VI CPUs. They can operate as multiple servers that permit flexible use of resources, including more efficient execution of job operations.

Each server consists of a cabinet containing various mounted components, a front door, rear door, and side covers as parts of the server structure.

An operator panel is mounted on the front door and is always accessible. Take special care in handling and storing the dedicated key is provided for the front door and the operator panel.

Sun Proprietary and Confidential

SPARC Enterprise M8000 Server Appearance

M9000 Server (Base Cabinet Only) Appearance

SPARC Enterprise M9000 Server (With an Expansion Cabinet) Appearance

Sun SPARC Enterprise M8000 Details:

Software	Details	Notes
Operating System	• Solaris 10 11/06 or later	• HOTPLUG support will be available in Solaris 10 (U4), expected July 2007. • Dynamic Reconfiguration (DR) will be available in Solaris 10 (U4), expected July 2007.
Management Software	Extended System Control Facility (XSCF)	• The M8000 servers come with XSCF monitoring/control facility. • The XSCF software manages hardware configuration and health, domain configuration and status, error monitor, and notification.
Hardware	**Details**	**Notes**

Processors (CPU's)	Up to 16 Processors	Processors are located on CPU/Memory Board Units (CMU). There are (4) CMU board slots in the M8000 server. CMU's are available with either (2 or 4) processors.
		
		• Supported CPU/Memory Board Units (CMU) include:
		  ◦ SPARC64 VI 2.4GHz dual-core processors with 6MB L2 cache.
		  ◦ SPARC64 VI 2.28GHz dual-core processors with 5MB L2 cache.
		• A minimum of (1) 2-processor or 4-processor CMU is required per M8000 server.
		• The M8000 server supports up to (16) domains.
		• A single CMU can be divided into multiple domains.
		• A minimum of (1) processor is required per domain.
		• Capacity on Demand (COD) CPU/Memory Board Units (CMU) are available.
		• UltraSPARC 1V+ processors are not supported in the Sun SPARC Enterprise M8000.

<table>
<tr>
<td>Memory</td>
<td>Maximum of 512GB</td>
<td>Memory is located on CPU/Memory Board Units (CMU). There are (4) CMU board slots in the M8000 server. There are (32) DIMM slots per CMU.

The (32) DIMM slots on a CMU is divided into Group A and Group B.
CMU's come with (16) of the (32) DIMM slots populated (Group A), but additional memory expansion kits can be added to the other (16) DIMM slots (Group B) on the CMU. Additional memory being added to a board can be added as factory installed (ATO) or for field install (PTO).
Memory Expansion Kits being added to Group B cannot be larger capacity kits than are installed in Group A on a CMU.
Memory added to a CMU must be added (16) DIMM's at a time.
Supported Memory Expansion Kits include 16GB(16x1GB), 32GB(16x2GB) and, 64GB(16x4GB).
</td>
</tr>
<tr>
<td>Internal I/O Expansion Slots</td>
<td>Up to 32 PCI-E slots (via 4 IOU's)</td>
<td>Internal PCI-E slots are located in the Internal I/O Units (IOU). Up to (4) IOU's can be installed into an M8000 server.

Each IOU has (8) PCI-E slots.
PCI-E slots in the IOU are x8 PCI-E slots.
IMPORTANT: The M8000 server also has (4) CPU/Memory Board Unit (CMU) slots, and to configure an IOU in the M8000 the corresponding CMU in the server must also be present. This means there must be at least as many CMU's in the server as IOU's. There can be more CMU's than IOU's in the server, but not vice versa.
Each IOU also has (4) SAS disk drive bays.
A PCI-E "Base I/O Card" is required (installed in slot 0 of the IOU) to support the first two SAS disk drives in the IOU.
Another PCI-E "Base I/O Card" is required (installed in slot 4 of the IOU) to support the third and fourth SAS disk drives in the IOU.
A PCI-E "Base I/O Card" is also required (installed in an even numbered slot in the IOU) to support the DVD-ROM and the DAT drive in the M8000 (the DAT drive is optional, but the DVD-ROM comes standard with all M8000 servers). If a PCI-E "Base I/O Card is already configured to support any SAS disk drives being added, then that base I/O Card can also be used for the DVD-ROM and DAT drive thus not requiring the addition of another card.

Additional Notes:

(1) PCI-E slot in an IOU will be needed for each "Optical Link Card" being used to connect "External I/O Expansion Units" to the M8000 server. (1) Optical Link Card is needed for each I/O Boat of an External I/O Expansion Unit.
Optical Link Cards need to be installed in an odd number slots in the IOU. A max of (4) Optical Link Cards are supported in an IOU.
</td>
</tr>
</table>

External I/O Expansion Slots	Up to 96 PCI-E or PCI-X slots (via 8 External I/O Expansion Units)	Up to (8) External I/O Expansion Units can be connected to an M8000 server. • Each External I/O Expansion Unit houses (1 or 2) PCI-E or PCI-X I/O Boats. • Each I/O Boat has (6) PCI-E or (6) PCI-X slots. • PCI-E and PCI-X I/O Boats can be mixed within an External I/O Expansion Tray. • (1) PCI-E slot in an IOU will be needed for **each** "Optical Link Card" being used to connect "External I/O Expansion Units" to the M8000 server. (1) Optical Link Card is needed for each I/O Boat of an External I/O Expansion Unit. • Optical Link Cards need to be installed in an odd number slots in the IOU. A max of (4) Optical Link Cards are supported in an IOU.
RAS Management	Extended System Control Facility (XSCF)	The Sun SPARC Enterprise M8000 servers come with a XSCF monitoring/control facility, which consists of a dedicated processor that is independent from the system processor. • The XSCF firmware runs on the service processor system. • The board with the installed XSCF firmware is called the XSCF unit (XSCFU). • The SPARC Enterprise M8000 servers are configured with redundant XSCF units.
Internal Disk Drives	Up to 16 SAS Disk Drives	• Supports 73GB 10K RPM, and 146GB 10K RPM 2.5" SAS disk drives. • SAS disk drives are located in the I/O Units (IOU) of the M8000 server. • Each IOU also has (4) SAS disk drive bays. • Either (2 or 4) SAS disk drives are supported in an IOU (must always be installed in pairs). • Supports mixing of 73GB, and 146GB 10K RPM 2.5" SAS disk drives (must always be installed in pairs). • Minimum of (2) internal disks per system, however both disks are not required to be for the same base IO card. • Boot disks required for minimum of (1) domain, however they are not required for each domain. • The SAS disk drives are controlled by a PCI-E "Base I/O Card" installed in the IOU. • A PCI-E "Base I/O Card" is **required** (installed in slot 0 of the IOU) to support the first two SAS disk drives in the IOU. • Another PCI-E "Base I/O Card" is **required** (installed in slot 4 of the IOU) to support the third and fourth SAS disk drives in the IOU.

Internal DVD-ROM	Includes DVD-ROM	• Each M8000 server base includes a DVD-ROM • A PCI-E "Base I/O Card" is **required** (installed in an even numbered slot in the IOU) to support the DVD-ROM (and the optional DAT drive) in the M8000 server. • If a PCI-E "Base I/O Card is already configured to support any SAS disk drives being added, then that base I/O Card **can** also be used for the DVD-ROM and DAT drive thus not requiring the addition of another card. • The DVD drive cannot be directly shared by multiple domains. However, if the multiple domains are connected to one another through a LAN and a certain function of the Solaris Operating System is used, the DVD drive can be shared by the domains. Adequate consideration of security is necessary before you configure LAN connections between domains.
Internal Tape Drive	Optional DAT72 Tape Drive	• A PCI-E "Base I/O Card" is needed to support the optional DAT72 tape drive. • If a PCI-E "Base I/O Card is already configured to support any SAS disk drives being added, then that base I/O Card **can** also be used for the DVD-ROM and DAT drive thus not requiring the addition of another card.
Internal Floppy Drive	None	• There is no floppy drive support on the Sun SPARC Enterprise M8000.
External Ports	**Details**	**Notes**
SCSI	None	• No built-in SCSI ports, additional HBA would be needed.
Fibre Channel	None	• No built-in fibre channel ports, additional HBA would be needed.
Ethernet	None	• There are no built-in general purpose network ports. Network ports are provided via the PCI-E "Base I/O Card", and other PCI/PCI-E network adapters. • Each PCI-E "Base I/O Card" has (2) gigabit ethernet ports. • The redundant Extended System Control Facility Units (XSCFU) n the M8000 have (2) 10/100 ethernet ports that are used for system management.
Serial	None	• There are no built-in general purpose serial ports. • The redundant Extended System Control Facility Units (XSCFU) in the M8000 have (1) RJ45 serial port that are used for system management.

USB	None	• There are no built-in general purpose USB ports. • The redundant Extended System Control Facility Units (XSCFU) in the M8000 have (1) USB port that a field engineer can use to download hardware information.
Keyboard	None	
Video	None	
External Storage	**Details**	
Disk Storage	D240, 2540, FLX280, 3120, 3320, 3510, 3511, 5320 NAS, 6140, 6540, FLX380, 9910, 9960, 9970, 9980, 9985, 9990	
Tape Storage	DAT72 USB Desktop, DAT72 Desktop, DAT72 Rackmount, SDLT320 Desktop, SDLT600 Desktop, SDLT600 Rackmount, LTO3 Desktop, LTO3 Rackmount, L20, L40, L80, C2, C4, L180, L700, L1400, SL500 (LTO), SL500 (Mixed Media), SL8500	
Supported Boot Devices	**Details**	
Primary Boot Device	Internal SAS disk drives located in I/O Units (IOU) of M8000 server. • SAS disk drives are installed in pairs and are mirrored. • The M8000 supports up to (16) internal SAS disk drives thus providing enough internal boot disks for (8) domains. • External boot devices would also be needed for M8000 servers being configured with more than (8) domains.	
Additional Supported Boot Devices	Sun StorageTek 2540	
	Sun StorageTek 3120	
	Sun StorageTek 3510	
	Sun StorageTek 9985	
	Sun StorageTek 9990	
Physical Specs	**Details**	
Height	• 70.9" (180 cm) Base Cabinet • 70.9" (180 cm) Base Cabinet + Power Cabinet	
Width	• 29.5" (75 cm) Base Cabinet • 41.5" (105.4 cm) Base Cabinet + Power Cabinet	
Depth	• 49.6" (126 cm) Base Cabinet • 49.6" (126 cm) Base Cabinet + Power Cabinet	
Weight	• 1543.2 lbs (700 kg) Base Cabinet • 2248.7 lbs (1020 kg) Base Cabinet + Power Cabinet	

Electrical Specs	Details
Input Voltage	• 200 - 240 VAC, with 4 CMUs and 4 IOUs installed. • 200 - 240 VAC, Three-Phase Delta Power Supplies (Base + Power Cabinet), with 4 CMUs and 4 IOUs installed. • 380 - 415 VAC, Three-Phase Star Power Supplies (Base + Power Cabinet), with 4 CMUs and 4 IOUs installed.
VA Rating	• 11,000 VA @ 200 VAC, Base Cabinet, with 4 CMUs and 4 IOUs installed. • 11,000 VA @ 200 VAC, Three-Phase Delta Power Supplies (Base + Power Cabinet), with 4 CMUs and 4 IOUs installed. • 10,982 VA @ 380 VAC, Three-Phase Star Power Supplies (Base + Power Cabinet), with 4 CMUs and 4 IOUs installed.
Input Current	• 55 A @ 200 VAC, with 4 CMUs and 4 IOUs installed. • 55 A @ 200 VAC, Three-Phase Delta Power Supplies (Base + Power Cabinet), with 4 CMUs and 4 IOUs installed. • 28.9 A @ 380 VAC, Three-Phase Star Power Supplies (Base + Power Cabinet), with 4 CMUs and 4 IOUs installed.
Power Consumption	• 10,500W (Max), Base Cabinet, with 4 CMUs and 4 IOUs installed. • 10,500W (Max), Three-Phase Delta Power Supplies (Base + Power Cabinet), with 4 CMUs and 4 IOUs installed. • 10,500W (Max), Three-Phase Star Power Supplies (Base + Power Cabinet), with 4 CMUs and 4 IOUs installed.
BTU	• 35,847 BTU/hr, Base Cabinet, with 4 CMUs and 4 IOUs installed. • 35,847 BTU/hr, Three-Phase Delta Power Supplies (Base + Power Cabinet), with 4 CMUs and 4 IOUs installed. • 35,847 BTU/hr, Three-Phase Star Power Supplies (Base + Power Cabinet), with 4 CMUs and 4 IOUs installed.
Rack Info	**Details**
M8000 Server Cabinet	The M8000 server is a stand alone server in it's own enclosure (single cabinet).

Sun SPARC Enterprise M9000-32 Details:

Software	Details	Notes
Operating System	• Solaris 10 11/06 or later	• Full compatibility with existing applications running on earlier versions of Solaris OS.. • HOTPLUG support will be available in Solaris 10 (U4), expected July 2007. • Dynamic Reconfiguration (DR) will be available in Solaris 10 (U4), expected July 2007.
Management Software	Extended System Control Facility (XSCF)	• The M9000 servers come with XSCF monitoring/control facility. • The XSCF software manages hardware configuration and health, domain configuration and status, error monitor, and notification.
Hardware	**Details**	**Notes**

Processors (CPU's)	Up to 32 Processors	Processors are located on CPU/Memory Board Units (CMU). There are (8) CMU board slots in the M9000-32 server. CMU's are available with either (2 or 4) processors.
		
		• Supported CPU/Memory Board Units (CMU) include:
		    • SPARC64 VI 2.4GHz dual-core processors with 6MB L2 cache.
		    • SPARC64 VI 2.28GHz dual-core processors with 5MB L2 cache.
		• A minimum of (1) 2-processor or 4-processor CMU is required per M9000-32 server.
		• The M9000-32 server supports up to (24) domains.
		• A single CMU can be divided into multiple domains.
		• A minimum of (1) processor is required per domain.
		• Capacity on Demand (COD) CPU/Memory Board Units (CMU) are available.
		• UltraSPARC 1V+ processors are not supported in the Sun SPARC Enterprise M8000.

Memory	Maximum of 1024GB	Memory is located on CPU/Memory Board Units (CMU). There are (8) CMU board slots in the M9000-32 server. There are (32) DIMM slots per CMU. • The (32) DIMM slots on a CMU is divided into Group A and Group B. • CMU's come with (16) of the (32) DIMM slots populated (Group A), but additional memory expansion kits can be added to the other (16) DIMM slots (Group B) on the CMU. Additional memory being added to a board can be added as factory installed (ATO) or for field install (PTO). • Memory Expansion Kits being added to Group B cannot be larger capacity kits than are installed in Group A on a CMU. • Memory added to a CMU must be added (16) DIMM's at a time. • Supported Memory Expansion Kits include 16GB(16x1GB), 32GB(16x2GB) and, 64GB(16x4GB).
Internal I/O Expansion Slots	Up to 64 PCI-E slots (via 8 IOU's)	Internal PCI-E slots are located in the Internal I/O Units (IOU). Up to (8) IOU's can be installed into an M9000-32 server. • Each IOU has (8) PCI-E slots. • PCI-E slots in the IOU are x8 PCI-E slots. • **IMPORTANT:** The M9000-32 server also has (8) CPU/Memory Board Unit (CMU) slots, and to configure an IOU in the M9000-32 the corresponding CMU in the server **must** also be present. This means there must be at least as many CMU's in the server as IOU's. There can be more CMU's than IOU's in the server, but not vice versa. • Each IOU also has (4) SAS disk drive bays. • A PCI-E "Base I/O Card" is **required** (installed in slot 0 of the IOU) to support the first two SAS disk drives in the IOU. • Another PCI-E "Base I/O Card" is **required** (installed in slot 4 of the IOU) to support the third and fourth SAS disk drives in the IOU. • A PCI-E "Base I/O Card" is also required (installed in an even numbered slot in the IOU) to support the DVD-ROM and the DAT drive in the M9000-32 (the DAT drive is optional, but the DVD-ROM comes standard with all M9000-32 servers). If a PCI-E "Base I/O Card is already configured to support any SAS disk drives being added, then that base I/O Card **can** also be used for the DVD-ROM and DAT drive thus not requiring the addition of another card. Additional Notes: • (1) PCI-E slot in an IOU will be needed for **each** "Optical Link Card" being used to connect "External I/O Expansion Units" to the M9000-32 server. (1) Optical Link Card is needed for each I/O Boat of an External I/O Expansion Unit. • Optical Link Cards need to be installed in an odd number slots in the IOU. A max of (4) Optical Link Cards are supported in an IOU.

External I/O Expansion Slots	Up to 192 PCI-E or PCI-X slots (via 16 External I/O Expansion Units)	Up to (16) External I/O Expansion Units can be connected to an M9000-32 server. • Each External I/O Expansion Unit houses (1 or 2) PCI-E or PCI-X I/O Boats. • Each I/O Boat has (6) PCI-E or (6) PCI-X slots. • PCI-E and PCI-X I/O Boats can be mixed within an External I/O Expansion Tray. • (1) PCI-E slot in an IOU will be needed for **each** "Optical Link Card" being used to connect "External I/O Expansion Units" to the M9000-32 server. (1) Optical Link Card is needed for each I/O Boat of an External I/O Expansion Unit. • Optical Link Cards need to be installed in an odd number slots in the IOU. A max of (4) Optical Link Cards are supported in an IOU.
RAS Management	Extended System Control Facility (XSCF)	The Sun SPARC Enterprise M9000 servers come with a XSCF monitoring/control facility, which consists of a dedicated processor that is independent from the system processor. • The XSCF firmware runs on the service processor system. • The board with the installed XSCF firmware is called the XSCF unit (XSCFU). • The SPARC Enterprise M8000 servers are configured with redundant XSCF units.
Internal Disk Drives	Up to 32 SAS Disk Drives	• Supports 73GB 10K RPM, and 146GB 10K RPM 2.5" SAS disk drives. • SAS disk drives are located in the I/O Units (IOU) of the M9000 server. • Each IOU also has (4) SAS disk drive bays. • Either (2 or 4) SAS disk drives are supported in an IOU (must always be installed in pairs). • Supports mixing of 73GB, and 146GB 10K RPM 2.5" SAS disk drives (must always be installed in pairs). • Minimum of (2) internal disks per system, however both disks are not required to be for the same base IO card. • Boot disks required for minimum of (1) domain, however they are not required for each domain. • The SAS disk drives are controlled by a PCI-E "Base I/O Card" installed in the IOU. • A PCI-E "Base I/O Card" is **required** (installed in slot 0 of the IOU) to support the first two SAS disk drives in the IOU. • Another PCI-E "Base I/O Card" is **required** (installed in slot 4 of the IOU) to support the third and fourth SAS disk drives in the IOU.

Internal DVD-ROM	Includes DVD-ROM	• Each M9000 server base includes a DVD-ROM • A PCI-E "Base I/O Card" is **required** (installed in an even numbered slot in the IOU) to support the DVD-ROM (and the optional DAT drive) in the M9000 server. • If a PCI-E "Base I/O Card is already configured to support any SAS disk drives being added, then that base I/O Card **can** also be used for the DVD-ROM and DAT drive thus not requiring the addition of another card. • The DVD drive cannot be directly shared by multiple domains. However, if the multiple domains are connected to one another through a LAN and a certain function of the Solaris Operating System is used, the DVD drive can be shared by the domains. Adequate consideration of security is necessary before you configure LAN connections between domains.
Internal Tape Drive	Optional DAT72 Tape Drive	• A PCI-E "Base I/O Card" is needed to support the optional DAT72 tape drive. • If a PCI-E "Base I/O Card is already configured to support any SAS disk drives being added, then that base I/O Card **can** also be used for the DVD-ROM and DAT drive thus not requiring the addition of another card.
Internal Floppy Drive	None	• There is no floppy drive support on the Sun SPARC Enterprise M9000.
External Ports	**Details**	**Notes**
SCSI	None	• No built-in SCSI ports, additional HBA would be needed.
Fibre Channel	None	• No built-in fibre channel ports, additional HBA would be needed.
Ethernet	None	• There are no built-in general purpose network ports. Network ports are provided via the PCI-E "Base I/O Card", and other PCI/PCI-E network adapters. • Each PCI-E "Base I/O Card" has (2) gigabit ethernet ports. • The redundant Extended System Control Facility Units (XSCFU) in the M9000 have (2) 10/100 ethernet ports that are used for system management.
Serial	None	• There are no built-in general purpose serial ports. • The redundant Extended System Control Facility Units (XSCFU) in the M9000 have (1) RJ45 serial port that are used for system management.

USB	None	• There are no built-in general purpose USB ports. • The redundant Extended System Control Facility Units (XSCFU) in the M9000 have (1) USB port that a field engineer can use to download hardware information.
Keyboard	None	
Video	None	
External Storage	Details	
Disk Storage	D240, 2540, FLX280, 3120, 3320, 3510, 3511, 5320 NAS, 6140, 6540, FLX380, 9910, 9960, 9970, 9980, 9985, 9990	
Tape Storage	DAT72 USB Desktop, DAT72 Desktop, DAT72 Rackmount, SDLT320 Desktop, SDLT600 Desktop, SDLT600 Rackmount, LTO3 Desktop, LTO3 Rackmount, L20, L40, L80, C2, C4, L180, L700, L1400, SL500 (LTO), SL500 (Mixed Media), SL8500	
Supported Boot Devices	**Details**	
Primary Boot Device	Internal SAS disk drives located in I/O Units (IOU) of M9000-32 server. • SAS disk drives are installed in pairs and are mirrored. • The M9000-32 supports up to (32) internal SAS disk drives thus providing enough internal boot disks for (16) domains. • External boot devices would also be needed for M9000-32 servers being configured with more than (16) domains.	
Additional Supported Boot Devices	Sun StorageTek 2540	
	Sun StorageTek 3120	
	Sun StorageTek 3510	
	Sun StorageTek 9985	
	Sun StorageTek 9990	
Physical Specs	**Details**	
Height	• 70.9" (180 cm) Base Cabinet • 70.9" (180 cm) Base Cabinet + Power Cabinet (1-Phase or 3-phase power)	
Width	• 33.5" (85 cm) Base Cabinet • 45.4" (115.4 cm) Base Cabinet + Power Cabinet (1-Phase or 3-phase power)	
Depth	• 49.6" (126 cm) Base Cabinet • 49.6" (126 cm) Base Cabinet + Power Cabinet (1-Phase or 3-phase power)	
Weight	• 1873.9 lbs (850 kg) Base Cabinet • 2843.9 lbs (1290 kg) Base Cabinet + Power Cabinet (1-Phase or 3-phase power)	

Electrical Specs	Details
Input Voltage	• 200 - 240 VAC Base Cabinet, with 8 CMUs and 8 IOUs installed. • 200 - 240 VAC Base + Power Cabinet, with 8 CMUs and 8 IOUs installed. • 200 - 240 VAC Three-Phase Delta Power Supplies (Base + Power Cabinet), with 8 CMUs and 8 IOUs installed. • 380 - 415 VAC Three-Phase Star Power Supplies (Base + Power Cabinet), with 8 CMUs and 8 IOUs installed.
VA Rating	• 22,400 VA @ 200 VAC Base Cabinet, with 8 CMUs and 8 IOUs installed. • 22,400 VA @ 200 VAC Base + Power Cabinet, with 8 CMUs and 8 IOUs installed. • 22,400 VA @ 200 VAC Three-Phase Delta Power Supplies (Base + Power Cabinet), with 8 CMUs and 8 IOUs installed. • 22,420 VA @ 380 VAC Three-Phase Star Power Supplies (Base + Power Cabinet), with 8 CMUs and 8 IOUs installed.
Input Current	• 112A @ 200 VAC Base Cabinet, with 8 CMUs and 8 IOUs installed. • 112A @ 200 VAC Base + Power Cabinet, with 8 CMUs and 8 IOUs installed. • 112A @ 200 VAC Three-Phase Delta Power Supplies (Base + Power Cabinet), with 8 CMUs and 8 IOUs installed. • 59A @ 380 VAC Three-Phase Star Power Supplies (Base + Power Cabinet), with 8 CMUs and 8 IOUs installed.
Power Consumption	• 21,300W (Max) Base Cabinet, with 8 CMUs and 8 IOUs installed. • 21,300W (Max) Base + Power Cabinet, with 8 CMUs and 8 IOUs installed. • 21,300W (Max) Three-Phase Delta Power Supplies (Base + Power Cabinet), with 8 CMUs and 8 IOUs installed. • 21,300W (Max) Three-Phase Star Power Supplies (Base + Power Cabinet), with 8 CMUs and 8 IOUs installed.
BTU's	• 72,718.2 BTU/hr Base Cabinet, with 8 CMUs and 8 IOUs installed. • 72,718.2 BTU/hr Base + Power Cabinet, with 8 CMUs and 8 IOUs installed. • 72,718.2 BTU/hr Three-Phase Delta Power Supplies (Base + Power Cabinet), with 8 CMUs and 8 IOUs installed. • 72,718.2 BTU/hr Three-Phase Star Power Supplies (Base + Power Cabinet), with 8 CMUs and 8 IOUs installed.
Rack Info	**Details**
M9000-32 Server Cabinet	The M9000-32 server is a stand alone server in it's own enclosure (single cabinet).

Sun SPARC Enterprise M9000-64 Details:

Software	**Details**	**Notes**
Operating System	• Solaris 10 11/06 or later	• Full compatibility with existing applications running on earlier versions of Solaris OS.. • HOTPLUG support will be available in Solaris 10 (U4), expected July 2007. • Dynamic Reconfiguration (DR) will be available in Solaris 10 (U4), expected July 2007.
Management Software	Extended System Control Facility (XSCF)	• The M9000 servers come with XSCF monitoring/control facility. • The XSCF software manages hardware configuration and health, domain configuration and status, error monitor, and notification.
Hardware	**Details**	**Notes**

Processors (CPU's)	Up to 64 Processors	Processors are located on CPU/Memory Board Units (CMU). There are (16) CMU board slots in the M9000-64 server (8 CMU slots per cabinet). CMU's are available with either (2 or 4) processors.
		
		• Supported CPU/Memory Board Units (CMU) include:
		  • SPARC64 VI 2.4GHz dual-core processors with 6MB L2 cache.
		  • SPARC64 VI 2.28GHz dual-core processors with 5MB L2 cache.
		• A minimum of (1) 2-processor or 4-processor CMU is required per M9000-64 server.
		• The M9000-64 server supports up to (24) domains.
		• A single CMU can be divided into multiple domains.
		• A minimum of (1) processor is required per domain.
		• Capacity on Demand (COD) CPU/Memory Board Units (CMU) are available.
		• UltraSPARC 1V+ processors are not supported in the Sun SPARC Enterprise M8000.

Memory	Maximum of 2048GB	Memory is located on CPU/Memory Board Units (CMU). There are (16) CMU board slots in the M9000-64 server (8 CMU slots per cabinet). There are (32) DIMM slots per CMU. • The (32) DIMM slots on a CMU is divided into Group A and Group B. • CMU's come with (16) of the (32) DIMM slots populated (Group A), but additional memory expansion kits can be added to the other (16) DIMM slots (Group B) on the CMU. Additional memory being added to a board can be added as factory installed (ATO) or for field install (PTO). • Memory Expansion Kits being added to Group B cannot be larger capacity kits than are installed in Group A on a CMU. • Memory added to a CMU must be added (16) DIMM's at a time. • Supported Memory Expansion Kits include 16GB(16x1GB), 32GB(16x2GB) and, 64GB(16x4GB).
Internal I/O Expansion Slots	Up to 128 PCI-E slots (via 16 IOU's)	Internal PCI-E slots are located in the Internal I/O Units (IOU). Up to (16) IOU's can be installed into an M9000-64 server (8 per cabinet). • Each IOU has (8) PCI-E slots. • PCI-E slots in the IOU are x8 PCI-E slots. • **IMPORTANT:** The M9000-64 server also has (16) CPU/Memory Board Unit (CMU) slots, and to configure an IOU in the M9000-64 the corresponding CMU in the server **must** also be present. This means there must be at least as many CMU's in the server as IOU's. There can be more CMU's than IOU's in the server, but not vice versa. • Each IOU also has (4) SAS disk drive bays. • A PCI-E "Base I/O Card" is **required** (installed in slot 0 of the IOU) to support the first two SAS disk drives in the IOU. • Another PCI-E "Base I/O Card" is **required** (installed in slot 4 of the IOU) to support the third and fourth SAS disk drives in the IOU. • A PCI-E "Base I/O Card" is also required (installed in an even numbered slot in the IOU) to support the DVD-ROM and the DAT drive in the M9000-64 (the DAT drive is optional, but the DVD-ROM comes standard with all M9000-64 servers). If a PCI-E "Base I/O Card is already configured to support any SAS disk drives being added, then that base I/O Card **can** also be used for the DVD-ROM and DAT drive thus not requiring the addition of another card. Additional Notes: • (1) PCI-E slot in an IOU will be needed for **each** "Optical Link Card" being used to connect "External I/O Expansion Units" to the M9000-64 server. (1) Optical Link Card is needed for each I/O Boat of an External I/O Expansion Unit. • Optical Link Cards need to be installed in an odd number slots in the

		IOU. A max of (4) Optical Link Cards are supported in an IOU.
External I/O Expansion Slots	Up to 192 PCI-E or PCI-X slots (via 16 External I/O Expansion Units)	Up to (16) External I/O Expansion Units can be connected to an M9000-64 server. • Each External I/O Expansion Unit houses (1 or 2) PCI-E or PCI-X I/O Boats. • Each I/O Boat has (6) PCI-E or (6) PCI-X slots. • PCI-E and PCI-X I/O Boats can be mixed within an External I/O Expansion Tray. • (1) PCI-E slot in an IOU will be needed for **each** "Optical Link Card" being used to connect "External I/O Expansion Units" to the M9000-64 server. (1) Optical Link Card is needed for each I/O Boat of an External I/O Expansion Unit. • Optical Link Cards need to be installed in an odd number slots in the IOU. A max of (4) Optical Link Cards are supported in an IOU.
RAS Management	Extended System Control Facility (XSCF)	The Sun SPARC Enterprise M9000 servers come with a XSCF monitoring/control facility, which consists of a dedicated processor that is independent from the system processor. • The XSCF firmware runs on the service processor system. • The board with the installed XSCF firmware is called the XSCF unit (XSCFU). • The SPARC Enterprise M8000 servers are configured with redundant XSCF units.
Internal Disk Drives	Up to 64 SAS Disk Drives	• Supports 73GB 10K RPM, and 146GB 10K RPM 2.5" SAS disk drives. • SAS disk drives are located in the I/O Units (IOU) of the M9000 server. • Each IOU also has (4) SAS disk drive bays. • Either (2 or 4) SAS disk drives are supported in an IOU (must always be installed in pairs). • Supports mixing of 73GB, and 146GB 10K RPM 2.5" SAS disk drives (must always be installed in pairs). • Minimum of (2) internal disks per system, however both disks are not required to be for the same base IO card. • Boot disks required for minimum of (1) domain, however they are not required for each domain. • The SAS disk drives are controlled by a PCI-E "Base I/O Card" installed in the IOU. • A PCI-E "Base I/O Card" is **required** (installed in slot 0 of the IOU) to support the first two SAS disk drives in the IOU. • Another PCI-E "Base I/O Card" is **required** (installed in slot 4 of the IOU) to support the third and fourth SAS disk drives in the IOU.

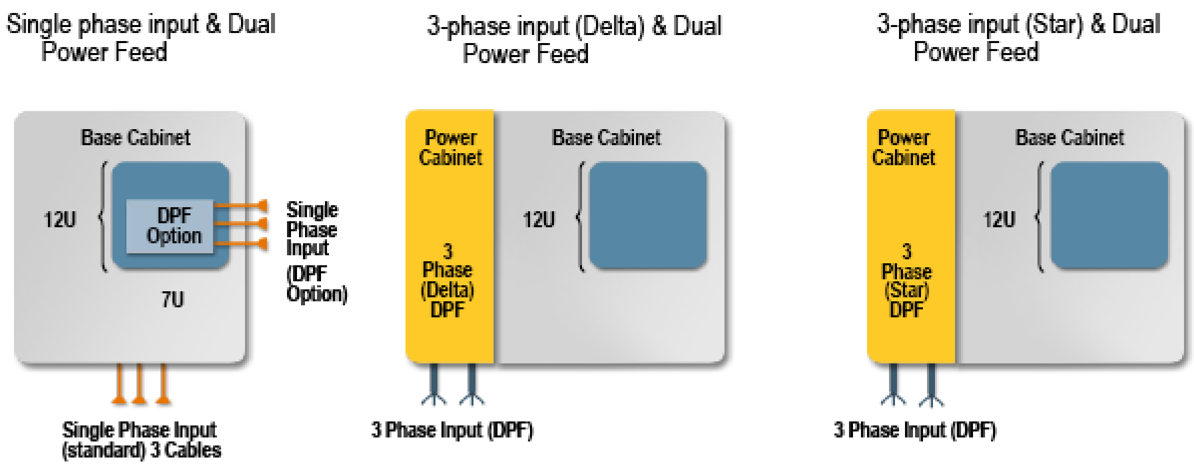
Internal DVD-ROM	Includes DVD-ROM	• Each M9000 server base includes a DVD-ROM • A PCI-E "Base I/O Card" is **required** (installed in an even numbered slot in the IOU) to support the DVD-ROM (and the optional DAT drive) in the M9000 server. • If a PCI-E "Base I/O Card is already configured to support any SAS disk drives being added, then that base I/O Card **can** also be used for the DVD-ROM and DAT drive thus not requiring the addition of another card. • The DVD drive cannot be directly shared by multiple domains. However, if the multiple domains are connected to one another through a LAN and a certain function of the Solaris Operating System is used, the DVD drive can be shared by the domains. Adequate consideration of security is necessary before you configure LAN connections between domains.
Internal Tape Drive	Optional DAT72 Tape Drive	• A PCI-E "Base I/O Card" is needed to support the optional DAT72 tape drive. • If a PCI-E "Base I/O Card is already configured to support any SAS disk drives being added, then that base I/O Card **can** also be used for the DVD-ROM and DAT drive thus not requiring the addition of another card.
Internal Floppy Drive	None	• There is no floppy drive support on the Sun SPARC Enterprise M9000.
External Ports	**Details**	**Notes**
SCSI	None	• No built-in SCSI ports, additional HBA would be needed.
Fibre Channel	None	• No built-in fibre channel ports, additional HBA would be needed.
Ethernet	None	• There are no built-in general purpose network ports. Network ports are provided via the PCI-E "Base I/O Card", and other PCI/PCI-E network adapters. • Each PCI-E "Base I/O Card" has (2) gigabit ethernet ports. • The redundant Extended System Control Facility Units (XSCFU) in the M9000 have (2) 10/100 ethernet ports that are used for system management.
Serial	None	• There are no built-in general purpose serial ports. • The redundant Extended System Control Facility Units (XSCFU) in the M9000 have (1) RJ45 serial port that are used for system management.

USB	None	• There are no built-in general purpose USB ports. • The redundant Extended System Control Facility Units (XSCFU) in the M9000 have (1) USB port that a field engineer can use to download hardware information.
Keyboard	None	
Video	None	
External Storage	**Details**	
Disk Storage	D240, 2540, FLX280, 3120, 3320, 3510, 3511, 5320 NAS, 6140, 6540, FLX380, 9910, 9960, 9970, 9980, 9985, 9990	
Tape Storage	DAT72 USB Desktop, DAT72 Desktop, DAT72 Rackmount, SDLT320 Desktop, SDLT600 Desktop, SDLT600 Rackmount, LTO3 Desktop, LTO3 Rackmount, L20, L40, L80, C2, C4, L180, L700, L1400, SL500 (LTO), SL500 (Mixed Media), SL8500	
Supported Boot Devices	**Details**	
Primary Boot Device	Internal SAS disk drives located in I/O Units (IOU) of M9000-64 server. • SAS disk drives are installed in pairs and are mirrored. • The M9000-64 supports up to (64) internal SAS disk drives thus providing more than enough internal boot disks for the up to (24) domains supported for the M9000-64.	
Additional Supported Boot Devices	Sun StorageTek 2540	
	Sun StorageTek 3120	
	Sun StorageTek 3510	
	Sun StorageTek 9985	
	Sun StorageTek 9990	
Physical Specs	**Details**	
Height	• 70.9" (180 cm) Base Cabinet + Expansion Cabinet • 70.9" (180 cm) Base Cabinet + Expansion Cabinet + Power Cabinet (1-Phase or 3-phase power)	
Width	• 65.9" (167.4 cm) Base Cabinet + Expansion Cabinet • 89.8" (228.2 cm) Base Cabinet + Expansion Cabinet + Power Cabinet (1-Phase or 3-phase power)	
Depth	• 49.6" (126 cm) Base Cabinet + Expansion Cabinet • 49.6" (126 cm) Base Cabinet + Expansion Cabinet + Power Cabinet (1-Phase or 3-phase power)	
Weight	• 4144.6 lbs (1880 kg) Base Cabinet + Expansion Cabinet • 5687.9 lbs (2580 kg) Base Cabinet + Expansion Cabinet + Power Cabinet (1-Phase or 3-phase power)	

Electrical Specs	Details
Input Voltage	• 200 - 240 VAC Base + Expansion Cabinet, with 16 CMUs and 16 IOUs installed. • 200 - 240 VAC Base + Expansion Cabinet + Power Cabinet, with 16 CMUs and 16 IOUs installed. • 200 - 240 VAC Three-Phase Delta Power Supplies (Base + Expansion Cabinet + Power Cabinet), with 16 CMUs and 16 IOUs installed. • 380 - 415 VAC Three-Phase Star Power Supplies (Base + Expansion Cabinet + Power Cabinet), with 16 CMUs and 16 IOUs installed.
VA Rating	• 44,800 VA @ 200 VAC Base + Expansion Cabinet, with 16 CMUs and 16 IOUs installed. • 44,800 VA @ 200 VAC Base + Expansion Cabinet + Power Cabinet, with 16 CMUs and 16 IOUs installed. • 44,800 VA @ 200 VAC Three-Phase Delta Power Supplies (Base + Expansion Cabinet + Power Cabinet), with 16 CMUs and 16 IOUs installed. • 44,840 VA @ 380 VAC Three-Phase Star Power Supplies (Base + Expansion Cabinet + Power Cabinet), with 16 CMUs and 16 IOUs installed.
Input Current	• 224A @ 200 VAC Base + Expansion Cabinet, with 16 CMUs and 16 IOUs installed. • 224A @ 200 VAC Base + Expansion Cabinet + Power Cabinet, with 16 CMUs and 16 IOUs installed. • 224A @ 200 VAC Three-Phase Delta Power Supplies (Base + Expansion Cabinet + Power Cabinet), with 6 CMUs and 16 IOUs installed. • 118A @ 380 VAC Three-Phase Star Power Supplies (Base + Expansion Cabinet + Power Cabinet), with 16 CMUs and 16 IOUs installed.
Power Consumption	• 42,600W (Max) Base + Expansion Cabinet, with 16 CMUs and 16 IOUs installed. • 42,600W (Max) Base + Expansion Cabinet + Power Cabinet, with 16 CMUs and 16 IOUs installed. • 42,600W (Max) Three-Phase Delta Power Supplies (Base + Expansion Cabinet + Power Cabinet), with 16 CMUs and 16 IOUs installed. • 42,600W (Max) Three-Phase Star Power Supplies (Base + Expansion Cabinet + Power Cabinet), with 16 CMUs and 16 IOUs installed.
BTU's	• 145,436.4 BTU/hr Base + Expansion Cabinet, with 16 CMUs and 16 IOUs installed. • 145,436.4 BTU/hr Base + Expansion Cabinet + Power Cabinet, with 16 CMUs and 16 IOUs installed. • 145,436.4 BTU/hr Three-Phase Delta Power Supplies (Base + Expansion Cabinet + Power Cabinet), with 16 CMUs and 16 IOUs installed. • 145,436.4 BTU/hr Three-Phase Star Power Supplies (Base + Expansion Cabinet + Power Cabinet), with 16 CMUs and 16 IOUs installed.
Rack Info	**Details**
M9000-64 Server Cabinet	The M9000-64 server is a stand alone server in it's own enclosure (two cabinets).

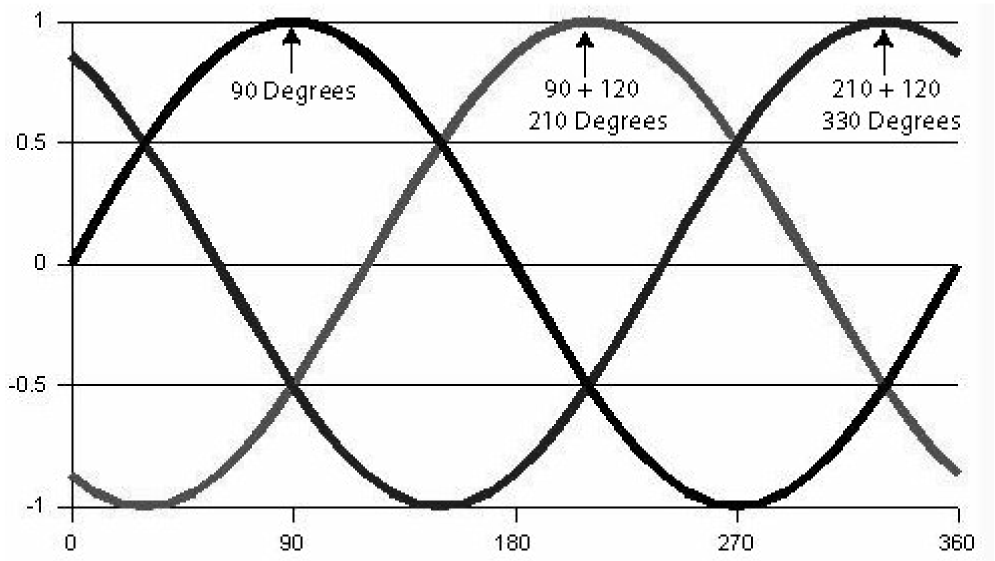
M8000 Power connections

	Descriptions	Remarks
1	Single phase DPF unit	7U rack unit for DC1 base cabinet, field installable
2	M8000 base cabinet + power cabinet for 3-Phase (delta) DPF	M8000 Base cabinet + Power cabinet for 3-Phase(delta)/ Dual Power Feed Power, 2 lines, Delta (208V) is mainly used in Japan and North America.
3	M8000 base cabinet + power cabinet for 3-Phase (star) DPF	M8000 Base cabinet + Power cabinet for 3-Phase(star)/ Dual Power Phase, 2 lines, Star(415V) is mainly used in EU region.



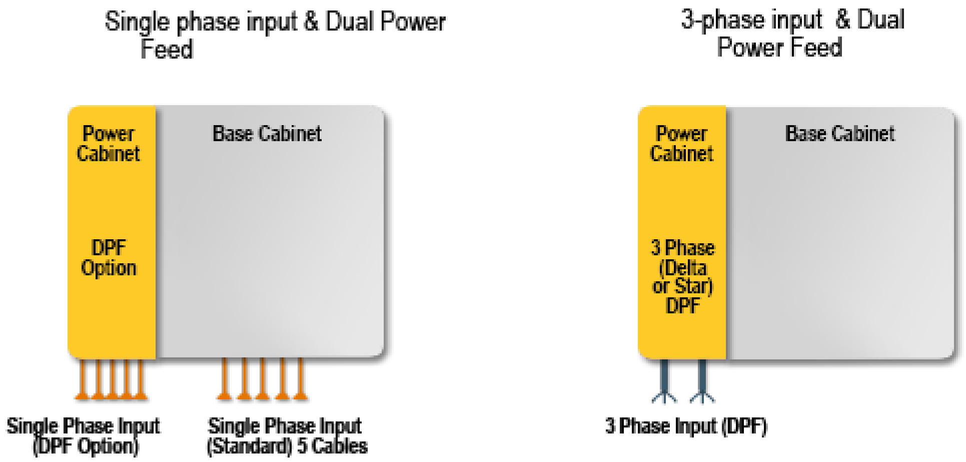
To use a three-phase power source, a three-phase power feed option and a power supply cabinet for mounting the option are required. The three-phase power feed has two connection options: a star connection that connects a neutral line and each phase, and a delta connection that connects each phase.

Three-phase power is simply three single phases synchronized and offset by 120 degrees from each other. Three-Phase Power Waveform as seen in the next diagram, at any given moment one of the three phases is nearing a peak and, therefore, provides a more even power signal then single-phase power.



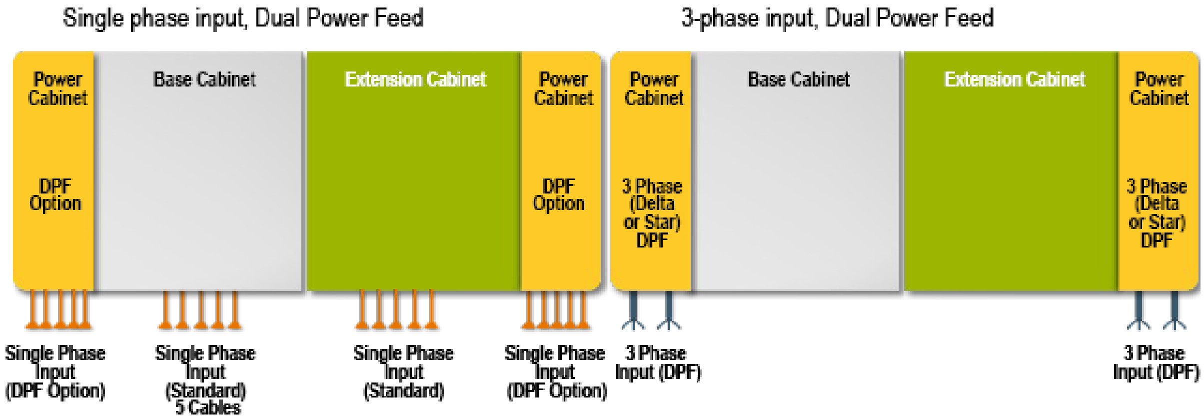
M9000 Power connections

	Descriptions	Remarks
1	power cabinet for single phase DPF	Power cabinet, field installable
2	M9000 base cabinet + power cabinet for 3-Phase (delta) DPF	M9000 base cabinet for 3-phase(delta)/ Dual Power Feed, 2 lines, Delta(208V) is mainly used in Japan and North America.
3	M9000 base cabinet + power cabinet for 3-Phase (star) DPF	M9000 base cabinet for 3-phase(star)/ dual Power Feed, 2 lines, Star(415V) is mainly used in EU region.



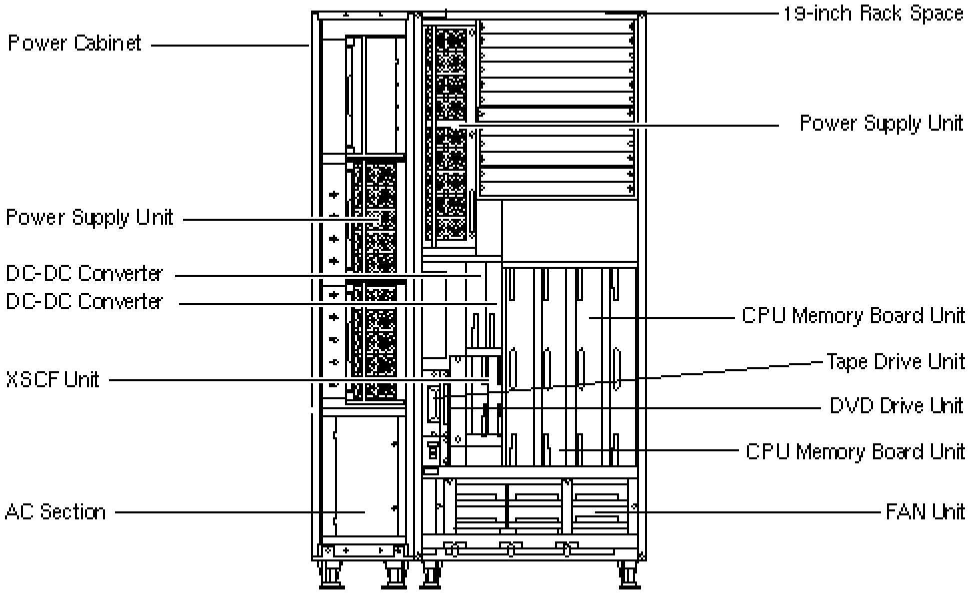
M9000 Dual Cabinet Power connections

	Descriptions	Remarks
1	Dual power cabinet for single phase DPF	2x Power cabinet, field installable
2	M9000 base + expansion cabinet, 3-Phase (delta), DPF	M9000 Base cabinet + Power cabinet for 3-Phase(delta)/ Dual Power Feed Power, 4 lines, Delta(208V) is mainly used in Japan and North America.
3	M9000 base + expansion cabinet, 3-Phase (star), DPF	M9000 Base cabinet + Power cabinet for 3-Phase(star)/ Dual Power Phase, 4 lines, Star(415V) is mainly used in EU region.



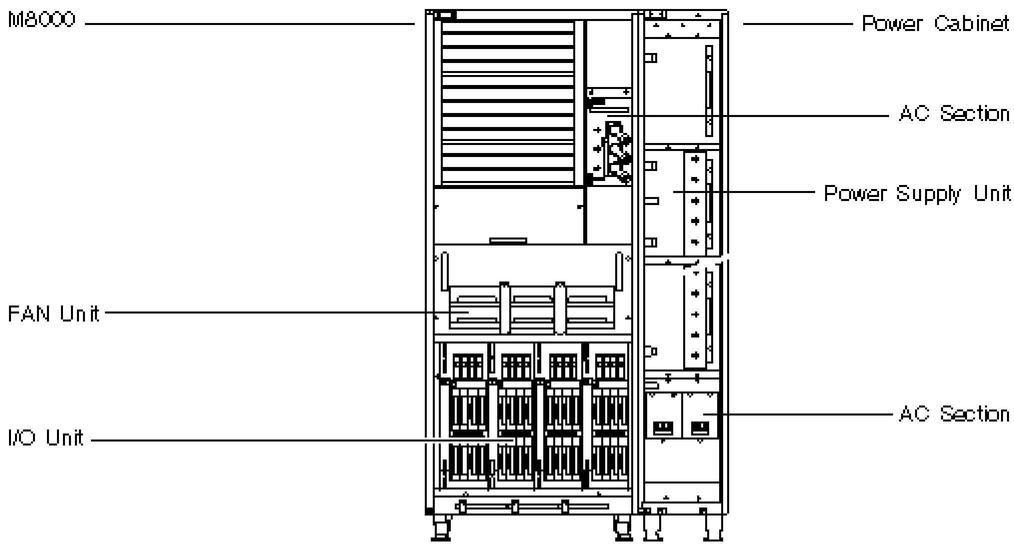
M8000 Server Components

SPARC Enterprise M8000 Server with a power cabinet.



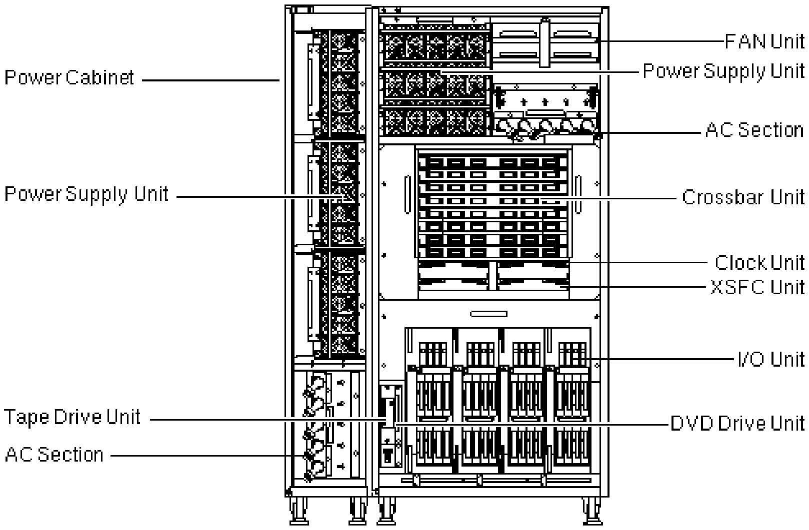
M8000 and Power Cabinet Front View

Ă@Ă@AC SectionĂ@ FAN Unit　I/O Unit

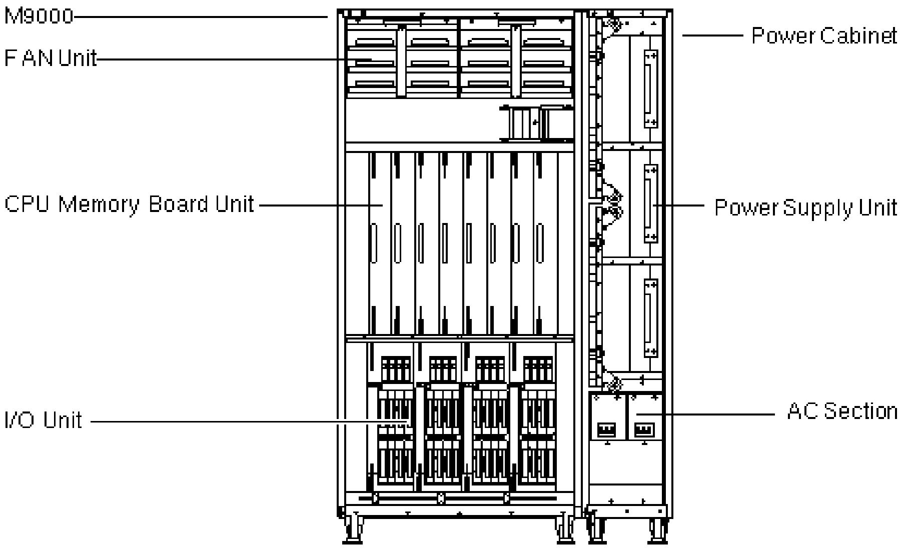


M9000 Server Components (Base Cabinet Only)

SPARC Enterprise M9000 Server (base cabinet only) with a power cabinet.

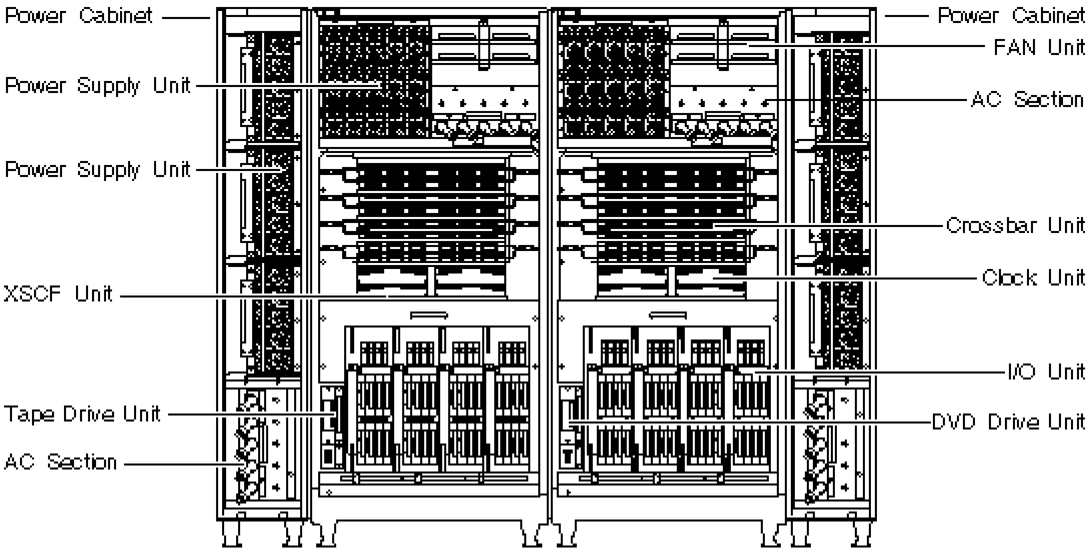


M9000 (Base Cabinet Only) and Power Cabinet Front View

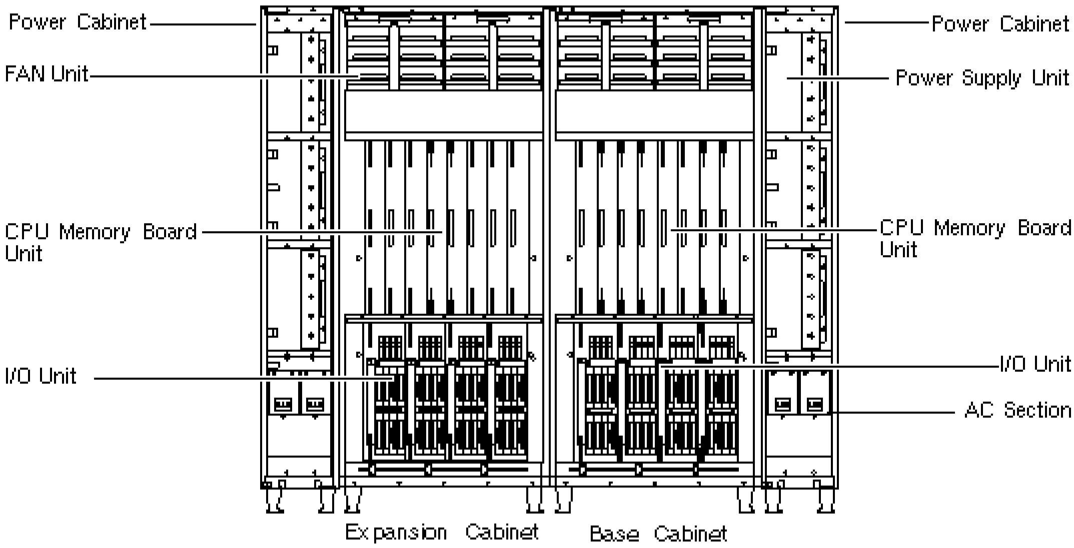


M9000 Server Components (With an Expansion Cabinet)

SPARC Enterprise M9000 Server (with an expansion cabinet) with a power cabinet



M9000 (With an Expansion Cabinet) and Power Cabinet Front View



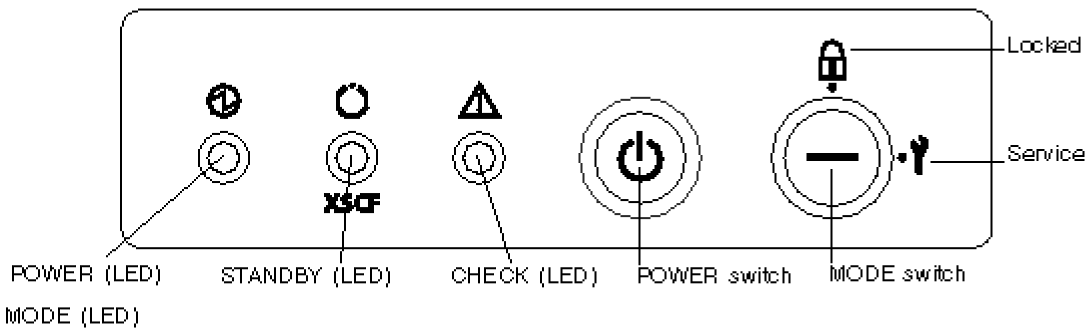
Operator Panel Overview

The operator panel has LEDs indicating different states of the M8000 and M9000 servers, a power switch for power control, and a mode switch for setting the operation mode.

For details about the operator panel, see the SPARC Enterprise M8000/M9000 Servers Service Manual.

The following figure shows the operator panel, and its LEDs and switches are described below.

Operator Panel Appearance



Operator Panel LEDs

LEDs	Name	Light color	Description of function and operating state
	POWER	Green	Indicates whether the main unit power is on. If this LED is on, the power is on.
	STANDBY	Green	Indicates the standby state of the main unit. If this LED is on, the power can be turned on.
	CHECK	Amber	Indicates the main unit operating status. (This is used to indicate a maintenance target, or it indicates that the unit cannot be started.) If this LED is on, a system error has been detected.

Operator Panel Switches

The switches on the operator panel include the mode switch for setting the operation mode and the POWER switch for turning on and off the SPARC Enterprise Server. To switch between system operation mode and maintenance mode, insert the dedicated key of the high-end server and change the mode switch setting.

Operator Panel Switches

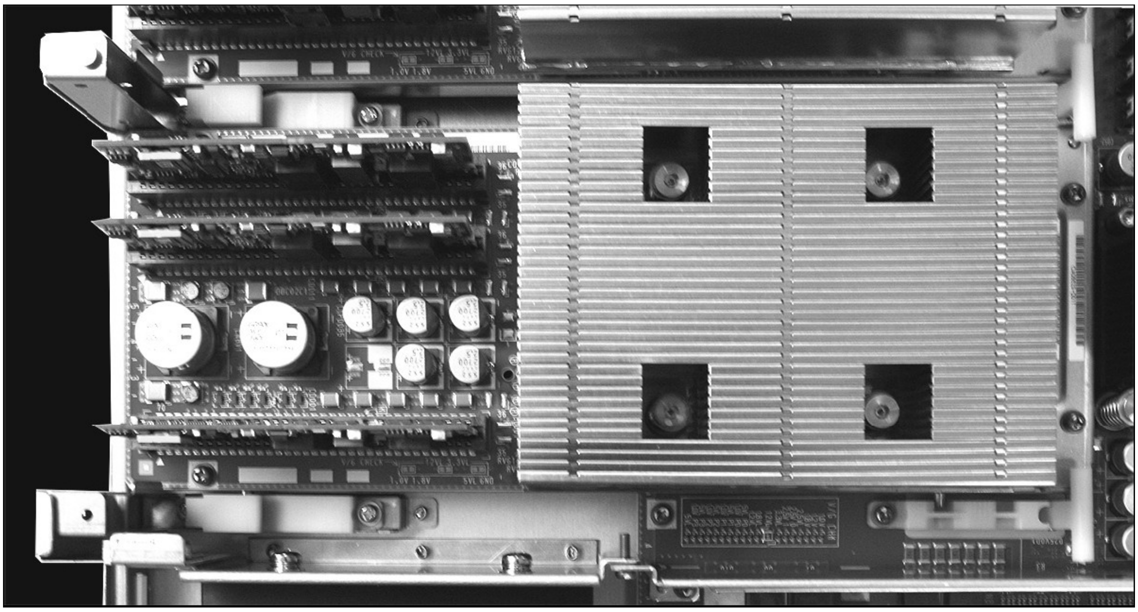
Switch	Name	Function
	POWER switch	Controls the main unit power.
	MODE switch	Selects between maintenance and normal operation. Use the dedicated key managed by the customer to switch between normal and maintenance modes.
	 Locked	This mode is set for normal operation.
	 Service	This mode is set for maintenance.

Server Components

This section describes the components of both high-end servers.

CPU Module

The CPU Module (CPUM) contains a SPARC64 VI CPU and a DC-DC converter (DDC). Up to four CPU modules (CPUMs) can be mounted on a CPU/Memory unit.



The CPUM has the following features:

- The CPUM contains a SPARC64 VI, a high-performance multicore CPU that uses the latest LSI process.
- If an unforeseen fault is detected, the SPARC64 VI CPU enables operation to continue without interruption by using an automatic recovery function, automatic retry function, or automatic degradation function, depending on how the system is configured.
- A redundant DDC configuration enables continuous operation even if a DDC fails.

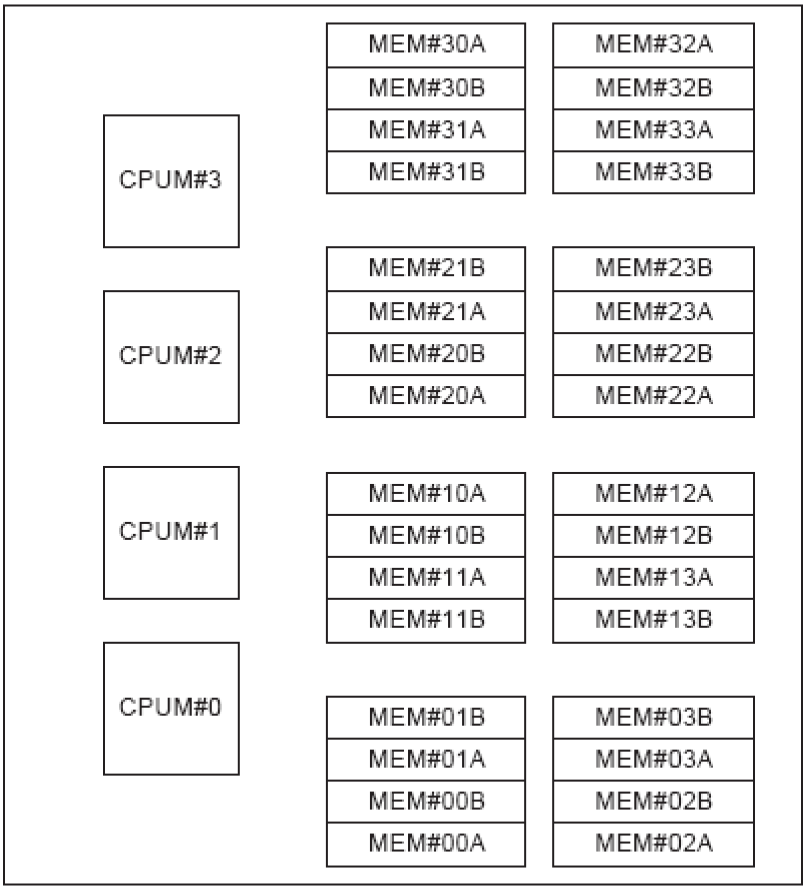
CPU/Memory Board Unit

The CPU/Memory Board Unit (CMU) contains CPUMs, memory modules, and a DDC. The CMU and an I/O units can be combined to construct one or more domains.

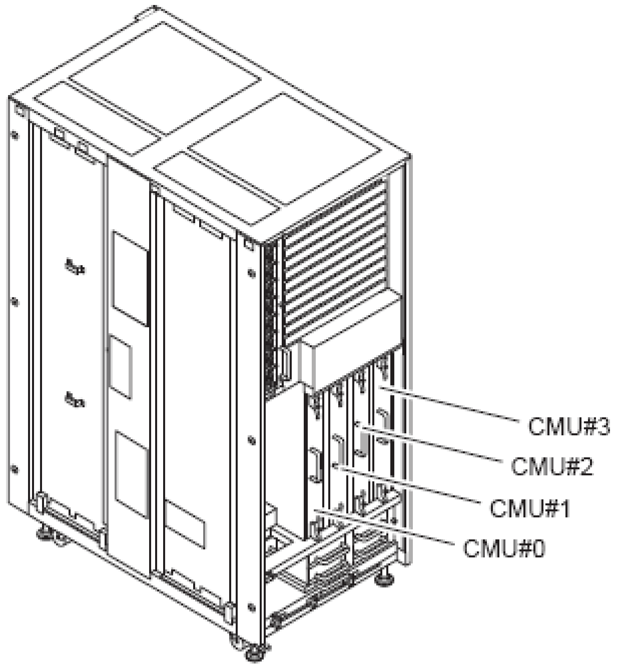
The CMU has the following features:

- Contains an interconnect LSI module that uses the latest LSI process.
- Uses Double Data Rate (DDR)II DIMM memory.
- Supports the DR function that enables hot maintenance and replacement of CMUs during system operation, and enables addition and deletion of active CMUs during system operation.
- A redundant DDC configuration enables continuous operation even if a DDC fails.

Memory DIMM and CPU Locations

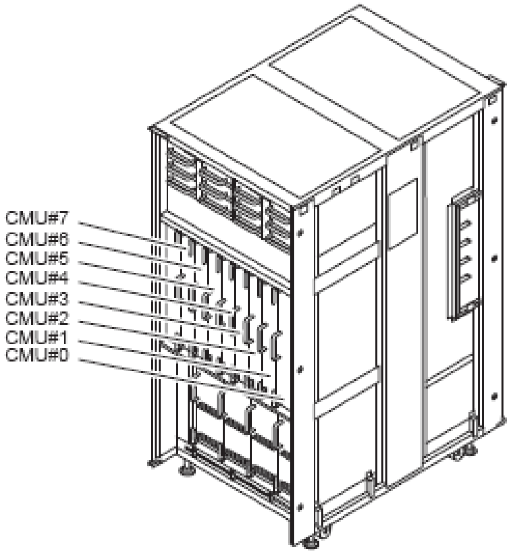


CMU locations

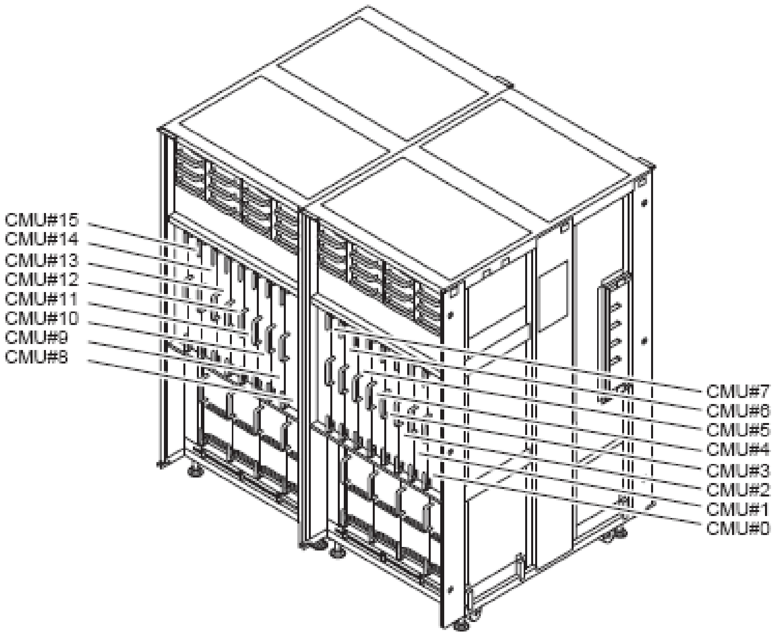
Server	Locations
M8000	

Server	Locations

M9000



M9000-64



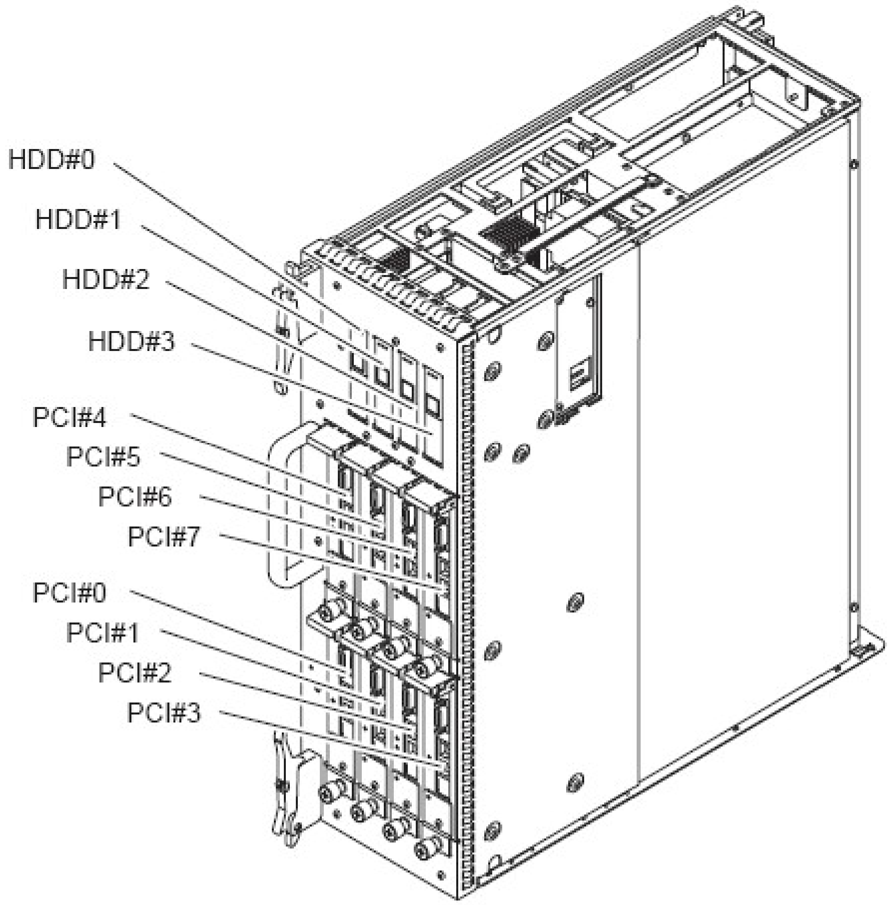
I/O Unit

The I/O unit (IOU) consists of a PCIe bridge control LSI module, a printed circuit board containing a DDC, a hard disk drive (HDD), PCIe slots, and PCI cassettes for the IOU. The IOU and the CMU can be combined to configure a server.

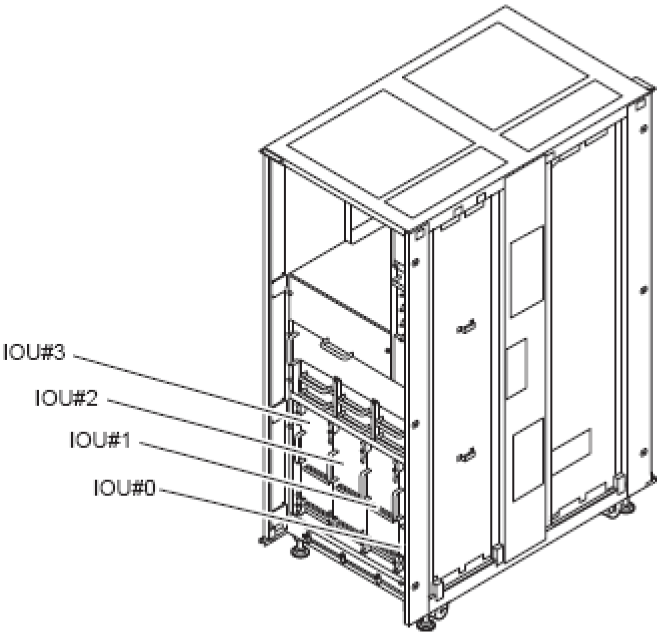
The IOU has the following features:

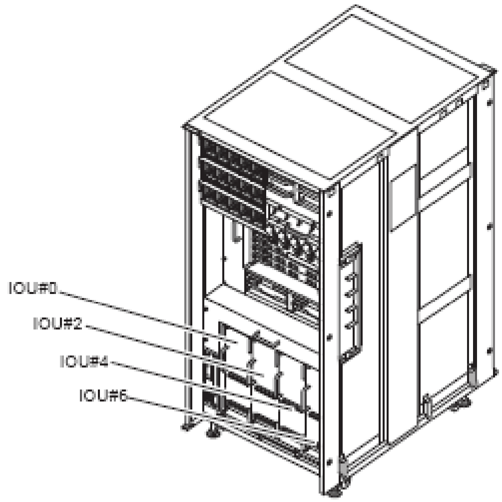
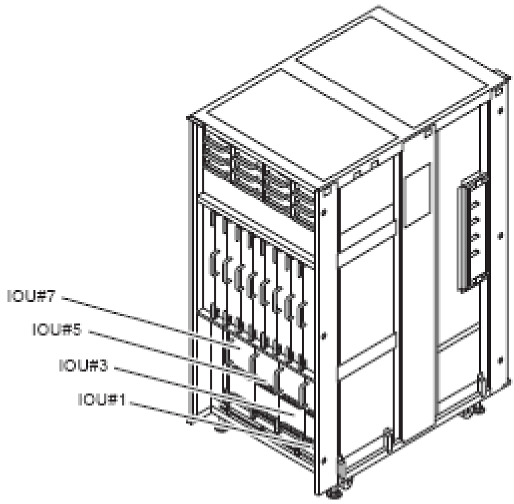
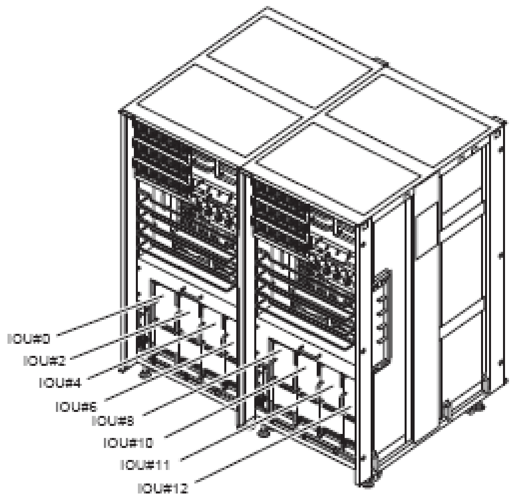
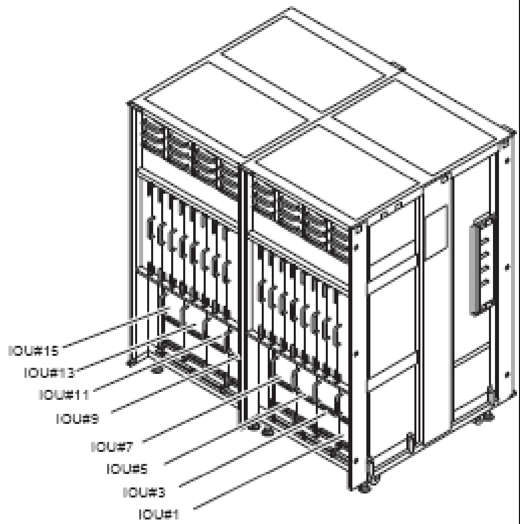
- It contains eight PCIe slots.
- The IOU Onboard Device Card_A (IOUA) can be used to connect the in-cabinet disk drive (2.5-inch SAS interface), the in-cabinet DVD-ROM drive, and a tape device. The LAN port (1000BASE-T/100Base-TX/100Base-T) mounted on the card can be used.
- It supports PCI hot-plug for External I/O Expansion Units and PCIe slots.
- An External I/O Expansion Unit can be used to connect the IOU to an External I/O Expansion Unit connection card.
- Supports the DR function that enables active maintenance and replacement of IOUs during system operation and enables addition and deletion of active IOUs during system operation.
- Insert the PCI Card into one of the supplied cassettes before inserting it into a built-in PCIe slot in the IOU. A PCI card whose length is up to 177.8 mm (short size) can be mounted in a slot.
- A redundant DDC configuration enables continuous operation even if a DDC fails.

IOU slot locations



IOU Locations

Server	Locations
M8000	

Server	Locations	
M9000	Front 	Rear 
M9000-64	Front 	Rear 

FAN Unit

FAN_B

FAN_A

The FAN unit is used to cool the server. There are two types of FAN units, with the following features:

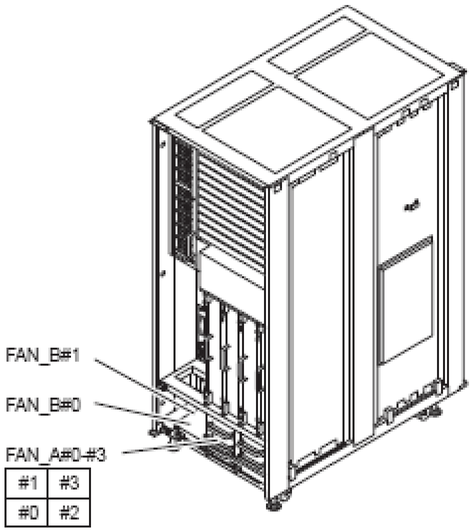
- A redundant fan configuration enables continuous system operation even if a fan fails during system operation.
- Hot system maintenance or replacement of a faulty fan can be performed during system operation.

Fan Backplane Locations

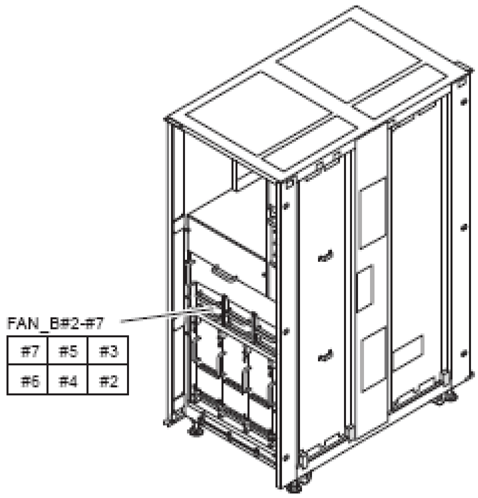
Server

M8000

Front

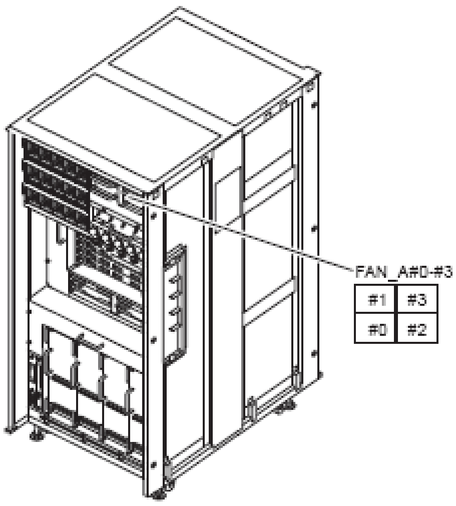


Rear

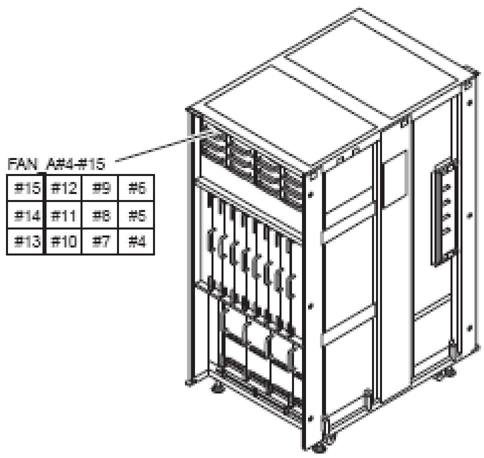


M9000

Front



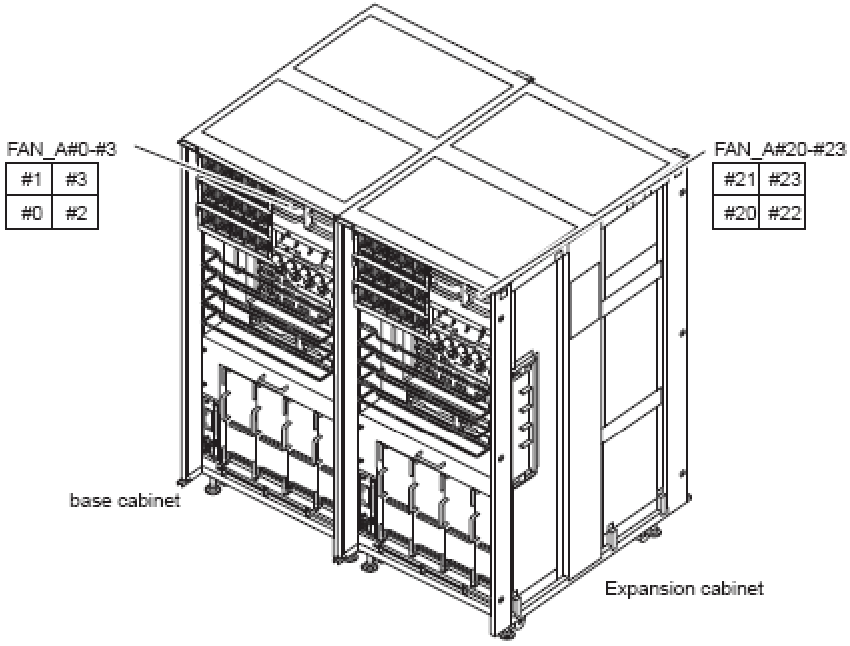
Rear



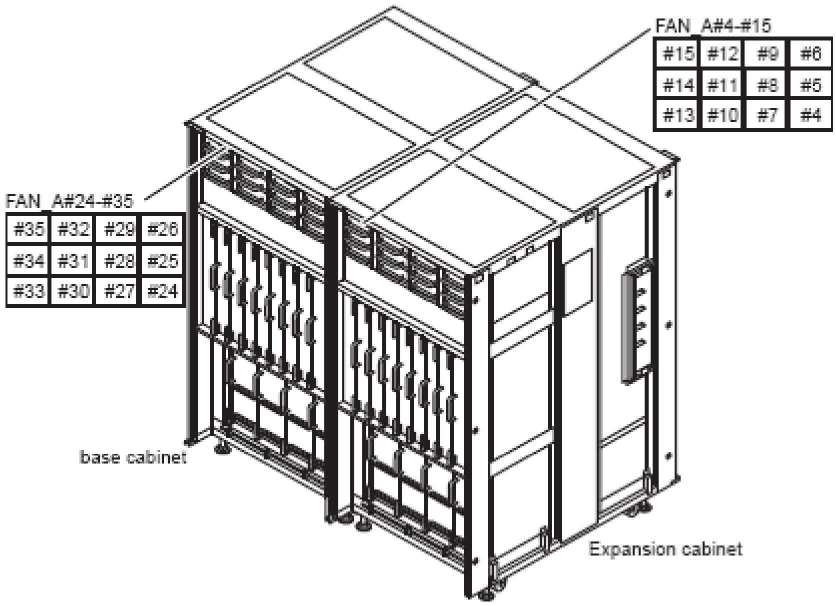
Server

M9000-64

Front



Rear



Power Supply Unit

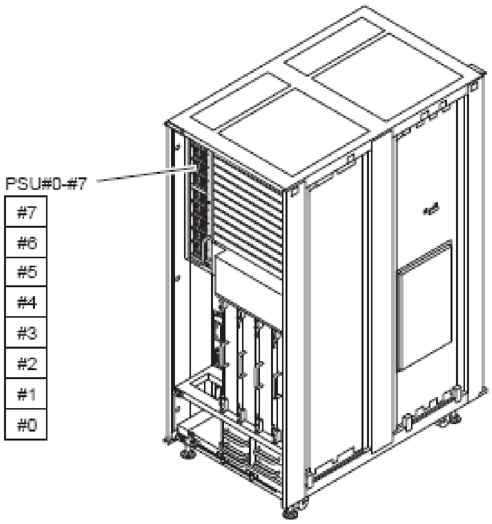
The power supply unit (PSU) feeds power to each unit, and has the following features:

- A redundant configuration enables the system operation to continue without interruption even if a power supply unit fails during system operation.
- Hot system maintenance or replacement of a faulty power supply unit can be performed during system operation.

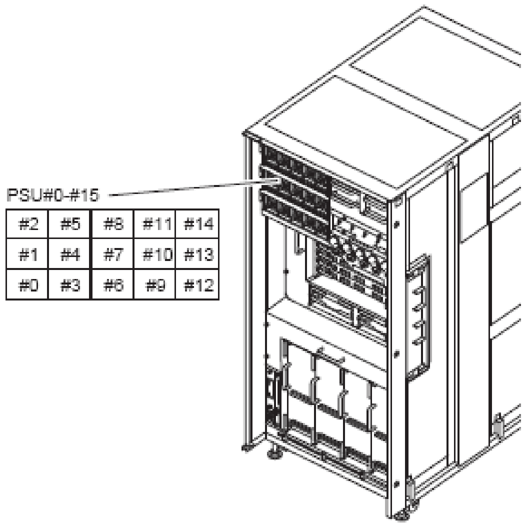
PSU Locations by Server

Server

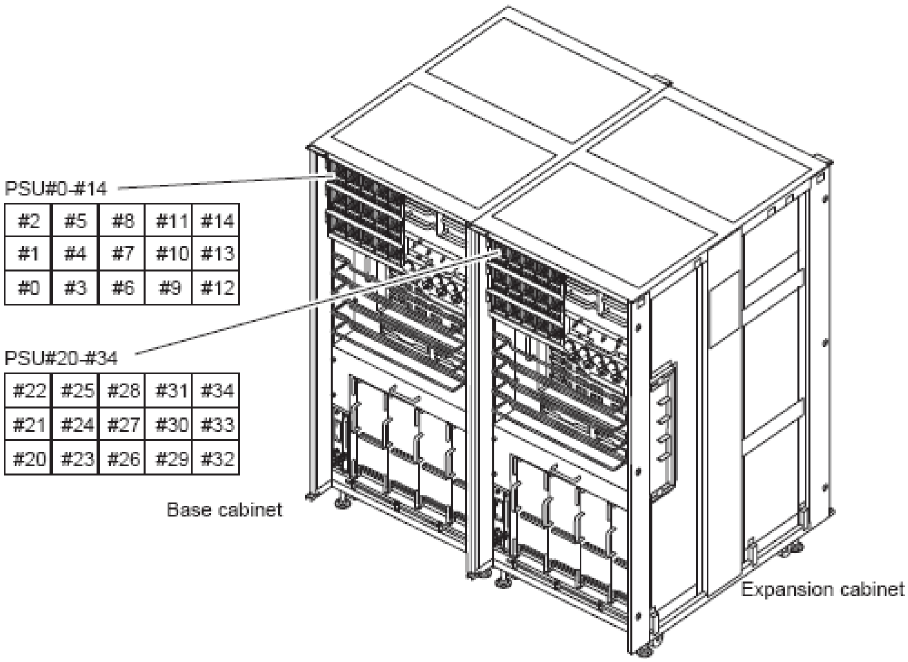
M8000



M9000



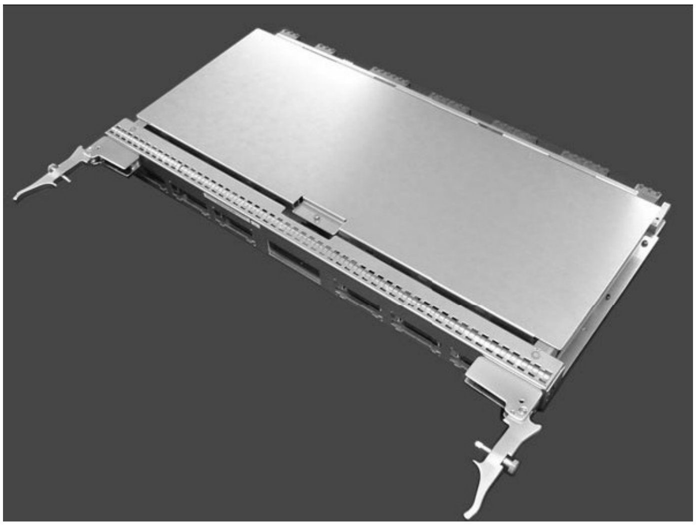
M9000-64



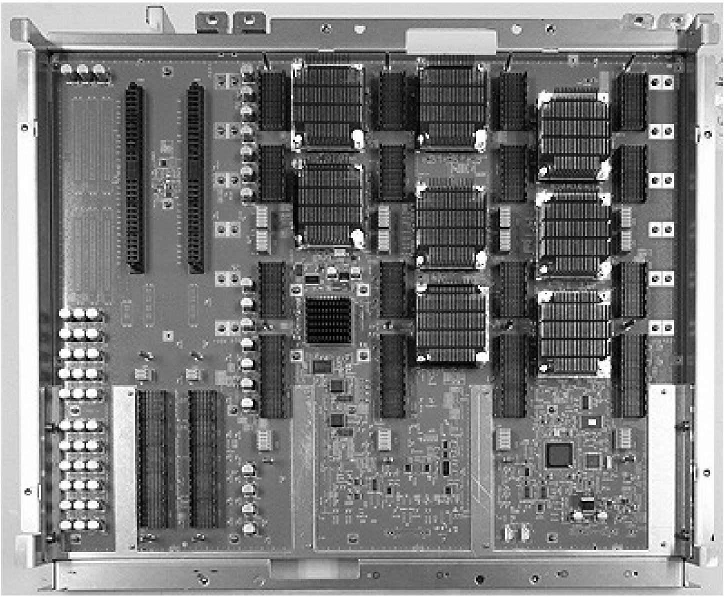
Crossbar Unit

The crossbar unit (XBU) consists of crossbar switches that logically connect CMUs and IOUs.

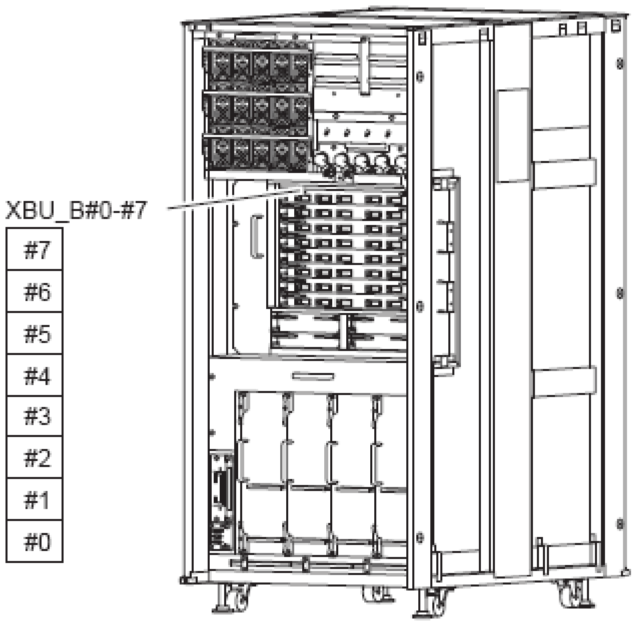
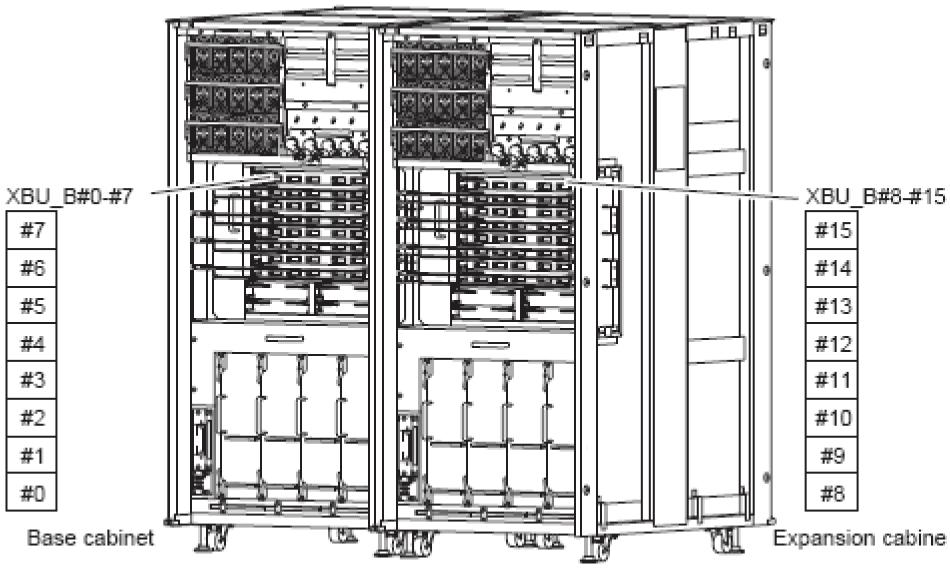
The XBU has redundant bus routes. If one route fails, the system can be restarted through the other route to continue operation.



The M8000 server does not have XBUs plugged into the BP, nor does it receive its clocking from a clock board. Instead, the M8000 server has active components mounted on to the BP. All the BPs have power busbar connections and environmental and logic control connectors.

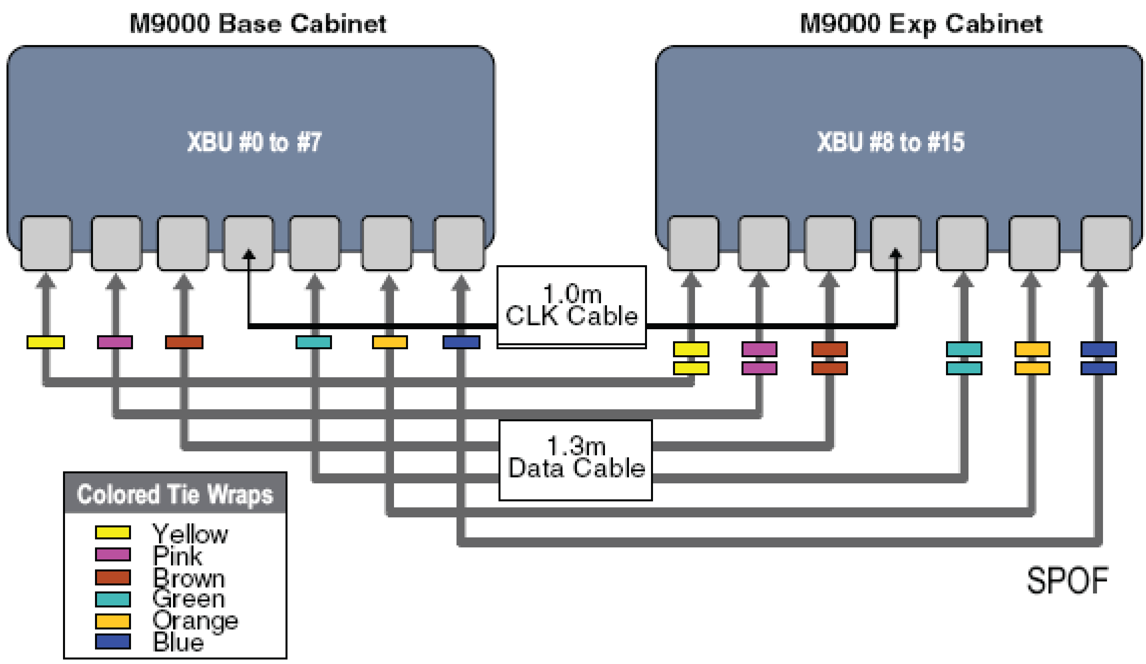


XBU Locations

Server
M9000 
M9000-64 

Connecting Cables Between XBUs

Eight individual XBU boards are plugged into the M9000 server's main cabinet. In the M9000-64 server, eight XBUs are also plugged into the expansion cabinet. The cables are labeled and color coded to simplify installation and service.

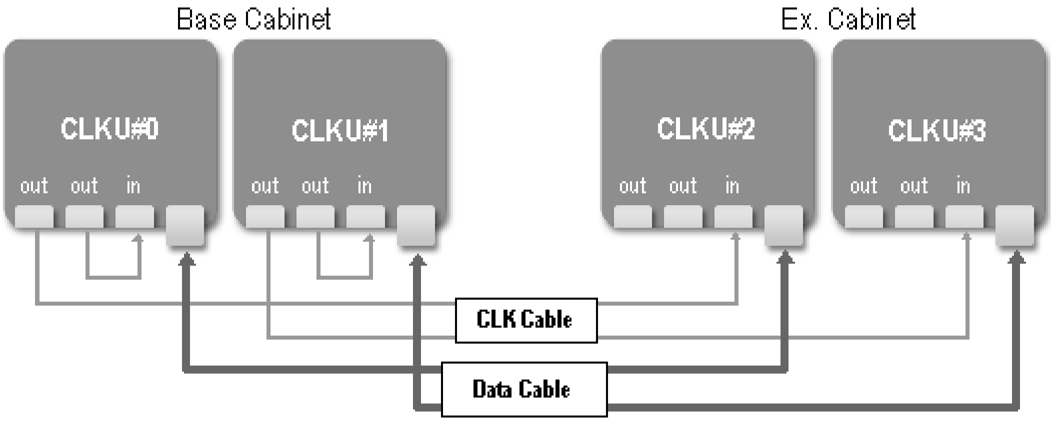


M9000 Cabling

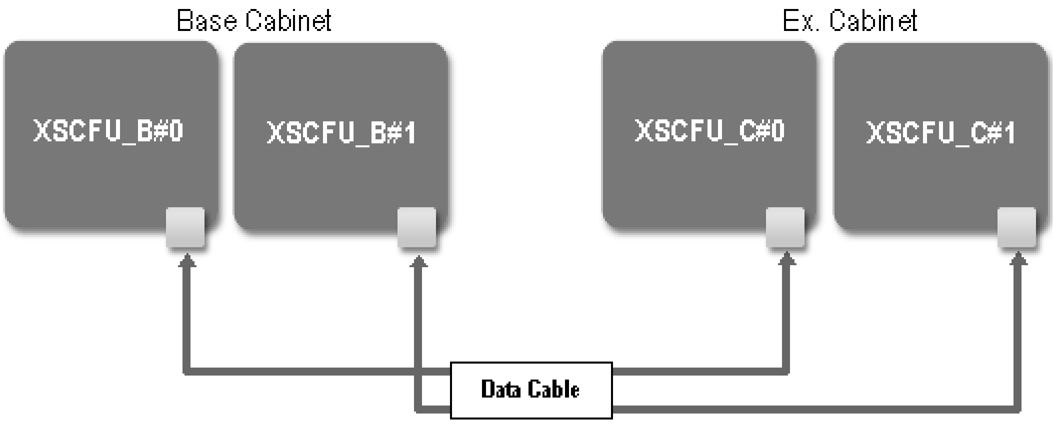
- XB Data : 48 cables
- XB CLK : 8 cables
- CLK Data : 2 cables
- CLK CLK : 4 cables
- XSCF Data : 2 cables

Total : 64 cables

Connecting Cables Between CLKUs



Connecting Cables Between XSCFUs



Clock Control Unit

The clock control unit (CLKU) contains an LSI module used for the clock.

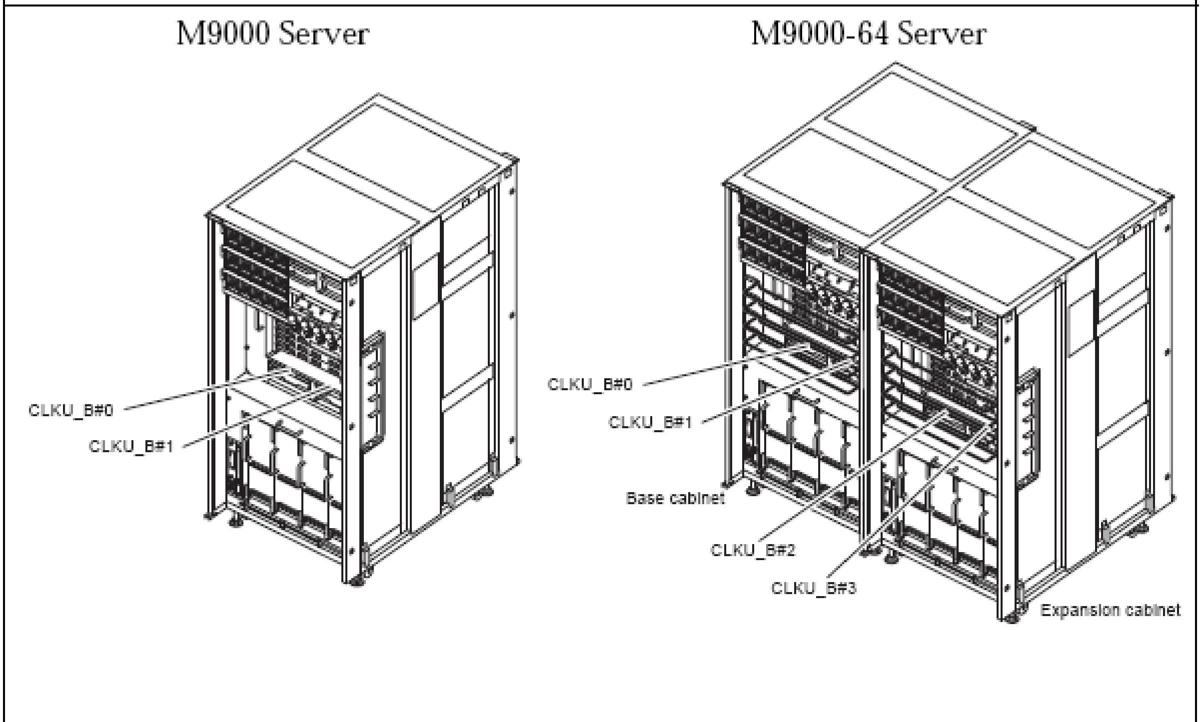
The CLKU has redundant clock supply routes. If one route fails, the system can be restarted through the other route to continue operation.

The Clock Control Unit (CLKU) is mounted in the M9000 and M9000-64 servers and supplies clock signals to the CMUs and XBUs.

The CLKUs are duplicated, but active maintenance cannot be performed on them. For the M9000-64 server, cables are available for connecting the clocks in the base cabinet to those in the extension cabinet.

Note – If the CLKU fails the system (domains) will go down. On reboot, the spare CLKU will take over clock functions.

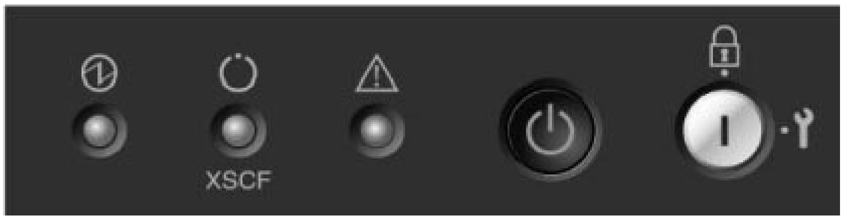
Servers



Operator Panel

The operator panel can be used to turn on and off the server power, switch between operation modes, and display system status information.

The operations of switches on the operator panel can be limited by switching the operation mode with the dedicated key supplied for the panel.



Operating Panel LEDs

LEDs	Name	Light color	Description of function and operating state
	POWER	Green	Indicates whether the main unit power is on. If this LED is on, the power is on.
	STANDBY	Green	Indicates the standby state of the main unit. If this LED is on, the power can be turned on.
⚠	CHECK	Amber	Indicates the main unit operating status. (This is used to indicate a maintenance target, or it indicates that the unit cannot be started.) If this LED is on, a system error has been detected.

Operator Panel Keyswitch

Setting	Name	Function
	Locked	This mode sets the server for normal operation, enabling error notifications.
	Service	This mode is set for maintenance. This mode disables error notification as components are removed.
	POWER	Controls the main unit power.

XSCF Unit

The XSCF unit (XSCFU) includes a dedicated processor, which operates independently from the main unit processors. The XSCFU in the servers adopts a duplicated configuration to increase fault tolerance.

The XSCFU is equipped with hardware interfaces for network connections to remote devices such as personal computers and workstations. A remote device can be connected via a network to the XSCF to control startup, settings, and operation management of the system.

The XSCFU provides the following hardware interfaces for network connections:

- Serial port
- LAN ports (10/100BASE-T/100Base-TX)

The XSCF can be accessed through network connections using these interfaces. The commandline interface (XSCF shell) and browser-based user interface (XSCF Web pages) provided by the XSCF enable operation and management of the servers.

For details, see the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers XSCF User's Guide*.

Internal Drive Units

The SPARC Enterprise M8000/M9000 servers contain the following in-cabinet drive units. These allow active replacement or addition:

Hard Disk Drive

The hard disk drive is a 2.5-inch hard disk drive with a serial attached SCSI (SAS) interface. It can be mounted in an IOU.

DVD-ROM Drive Unit/Tape Drive Unit

The DVD drive cannot be directly shared by multiple domains in a server. However, if the multiple domains are connected to one another through a LAN and a certain function of the Solaris Operating System is used, the DVD drive can be shared by the domains. Adequate consideration of security is necessary for LAN connections between domains.

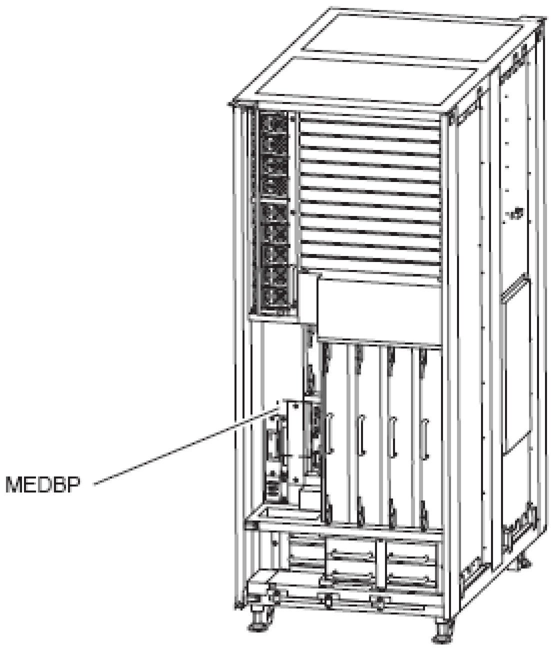
Media Backplane

A Media Backplane (MEDBP) provides the connectors for mounting a TAPEU and DVDU in a cabinet. These connectors serve as sockets for connecting a TAPEU and DVDU to the cabinet. A MEDBP is further connected to a switch backplane, through which it connects the TAPEU or DVDU to the IOU.
Note – Active maintenance cannot be performed on a MEDBP.

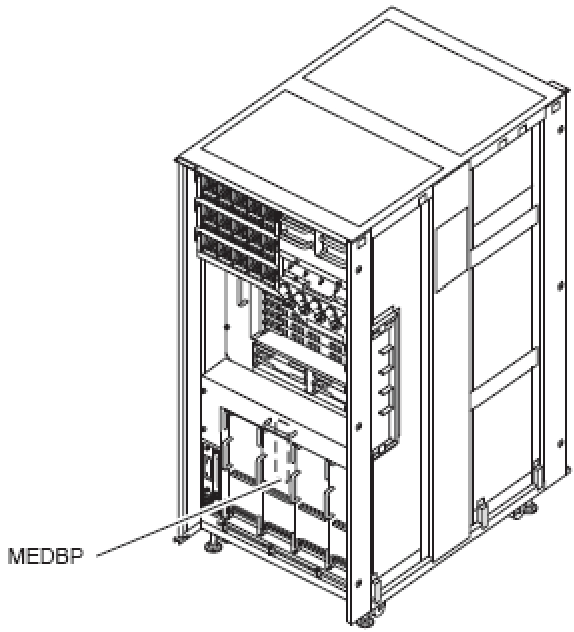
Media Backplane Locations by Server

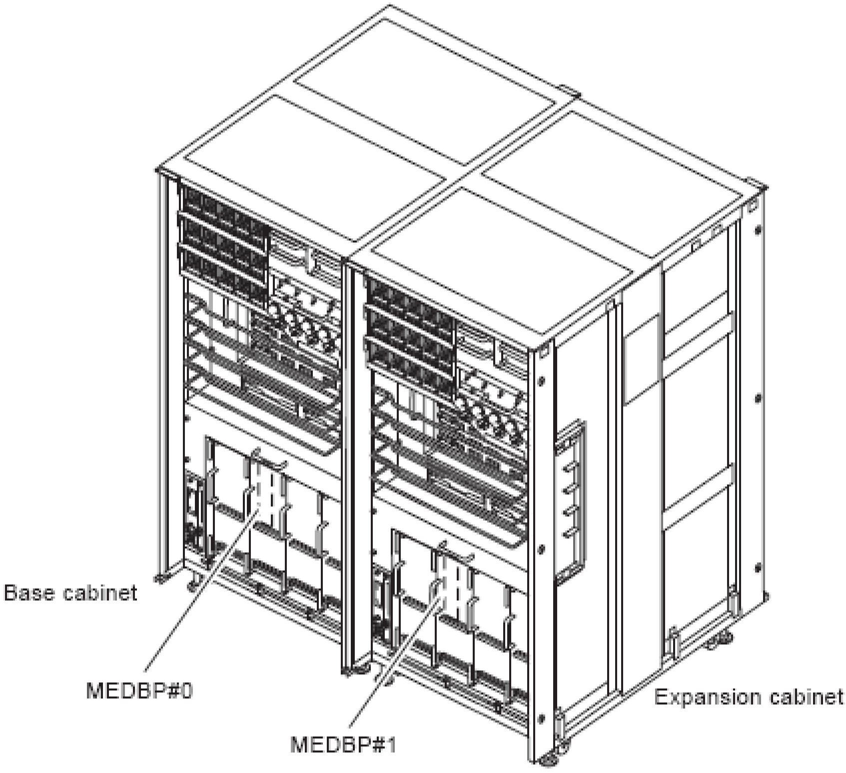
Server

M8000



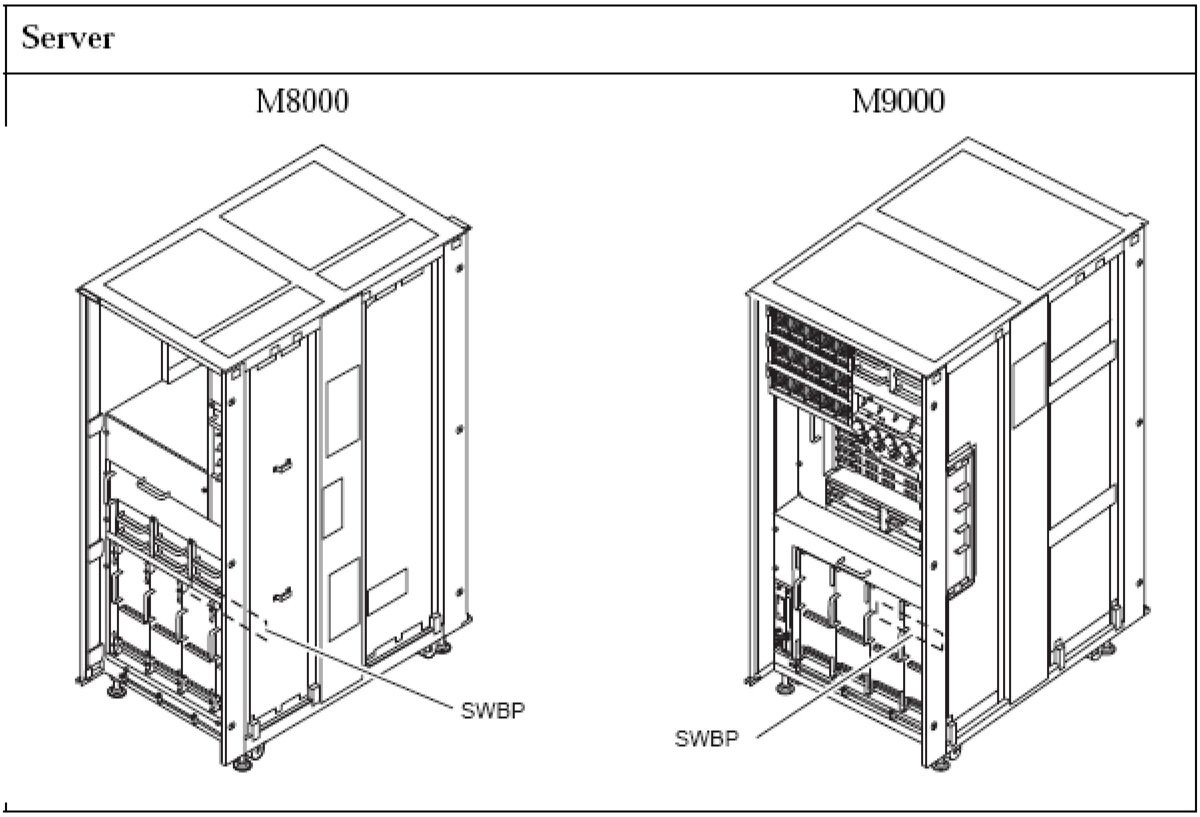
M9000

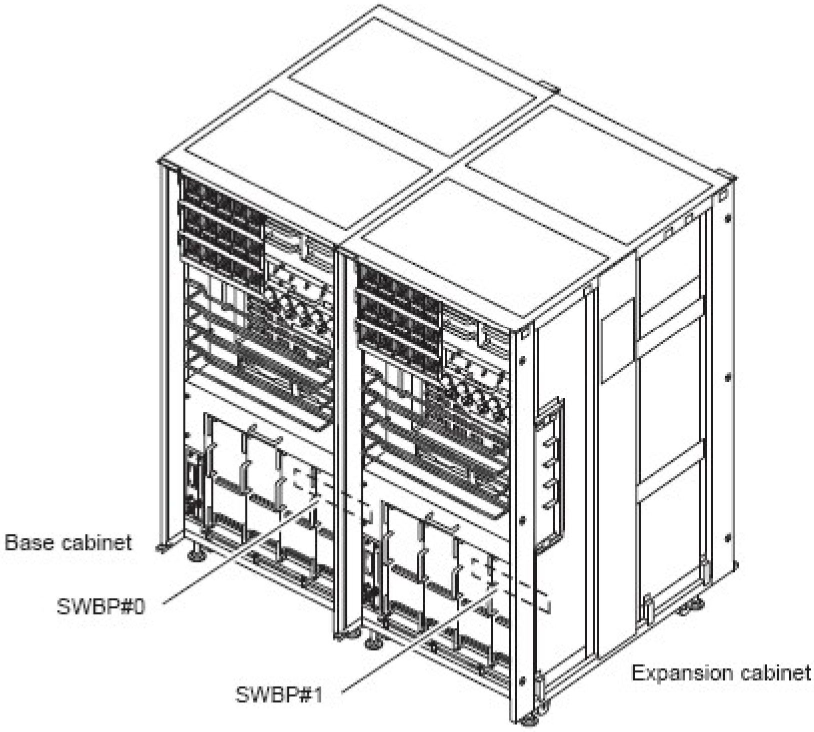


Server
M9000-64 

Switch Backplane

The Switch Backplane (SWBP) connects a TAPEU and DVD drive unit (DVDU) to an IOU through the media backplane. An expander that performs the switching of SAS interfaces is mounted on a SWBP. Active maintenance cannot be performed on an SWBP.



Server
M9000-64 

FRU Replacement Methods

There are three basic methods for replacing FRUs from the MX000 servers, these are:

- *Hot-FRU replacement* – Uses the XSCF replacefru command to power down the component. Hot-FRU removal is used for components not used by the Solaris OS domains.

- *Active-FRU replacement* – Uses dynamic reconfiguration (DR) to remove an active component. Active-FRU removal is used for components that are used by the Solaris OS domain to avoid disrupting the domain during the removal and replacement procedures.

- *Cold-FRU replacement* – Powers the system off and unplugs the power cables from the input power source. Cold-FRU removal is used when the component cannot be safely removed while the system is powered on.

Note – The replacefru command along with Hot-FRU removal, and Active-FRU removal are described in detail later in the course. In this module, you remove and install all components with power turned off.

Sun SPARC Enterprise M8000/M9000 FRU Replacement Options				
FRU	Description	Cold Replacement	Hot Replacement	Active Replacement
CMU	CPU Memory Board Unit	Yes	Yes	Yes
CPUM_A	CPU Module	Yes	Yes	Yes
CPUM_B	CPU Module	Yes	Yes	Yes
DIMM	Main Memory DIMM	Yes	Yes	Yes
IOU	I/O Unit	Yes	Yes	Yes, when redundantly configured. (Uses DR)
HDD	Hard Disk Drive	Yes	Yes	*Yes, if mirrored*
PCICS	PCI Cassette (including PCI board)	Yes	Yes	*Yes, when multi path is configured.*
IOUA	On board Device Card	Yes	Yes	*Yes, if boot disks are mirrored and multipathed*
PCIB-EX	I/O Box Down Link Card	Yes	Yes	*Yes*
XBU_B	Crossbar Units	Yes	No	No
CLKU_B	Clock Control Units	Yes	No	No
XSCFU_B	XSCF Units (Base Cabinet)	Yes	Yes	Yss

XSCFU_C	XSCF Unit (M9000 Expansion Cabinet)	Yes	Yes	Yes
DVDU	DVD Drive Unit	Yes	Yes	Yes
TAPEU	Tape Drive Unit	Yes	Yes	Yes
OPNL	Operator Panel	Yes	No	No
SNSU	Sensor Unit	Yes	No	No
PSU	Power Supply Unit	Yes	Yes, One unit at a time to support redundancy	Yes, One unit at a time to support redundancy
ACS_A	AC Section Single Phase (M8000)	Yes	No	No
ACS_B	AC Section Single Phase (M9000) and Optional Dual Power Feed Power Cabinet	Yes	No	No
ACS_C	AC Section Single Phase Dual Power Feed Option (M8000)	Yes	No	No
ACS_D	AC Section (3-Phase Dual Power Feed)	Yes	No	No
ACSTPH_A	M8000 3-Phase Delta Dual feed	Yes	No	No
ACSTPH_B	M8000 3-Phase Star Dual feed	Yes	No	No

ACSTPH_C	M9000 3-Phase Delta Dual feed	Yes	No	No
ACSTPH_D	M9000 3-Phase Star Dual feed	Yes	No	No
FAN_A	3 Fan Unit	Yes	Yes, One unit at a time to support redundancy	Yes, One unit at a time to support redundancy
FAN_B	2 Fan Unit	Yes	Yes, One unit at a time to support redundancy	Yes, One unit at a time to support redundancy
BP_A	Backplane (M8000)	Yes	No	No
DDC_A	DC-DC Converter (only found in M8000)	Yes	Yes	Yes
BP_B	Backplane (M9000)	Yes	No	No
PSUBP_A	PSU Backplane (M9000)	Yes	No	No
PSUBP_B	PSU Backplane (M8000)	Yes	No	No
FANBP_A	Fan Backplane (M9000)	Yes	No	No
FANBP_B	Fan Backplane (M9000)	Yes	No	No
FANBP_C	Fan Backplane (M8000)	Yes	No	No
MEDBP	Media Backplane	Yes	No	No
SWBP	Switch Backplane	Yes	No	No

RDPF	Rack Mountable Dual Feed Option (M8000)	Yes	No	No

The information in the table above comes from the *Sun SPARC® EnterpriseM8000/M9000 Servers Service Manual, Appendix C.*

Component Mounting Conditions

- CPUMs can be added in units of two modules.
- Dual inline memory module (DIMMs) can be added in units of 16 modules.
- If you add an IOU, a CMU must be mounted for the slot with the same slot number.
- IOU Onboard Device Card_A (IOUA) can be mounted in PCIe Slot #0, #2, #4, and #6 in the IOU.
- External I/O Expansion Unit connection cards can be mounted in PCIe Slot #1, #3, #5, and #7 in the IOU.

Optional Products

Power Supply Options

The power cabinet and the rack-mountable dual power feed option for the SPARC Enterprise M8000 server are offered as power supply options.

The power cabinet enables dual power feed or three-phase power feed.

The rack-mountable dual power feed option for the SPARC Enterprise M8000 server receives power from two external AC power sources that are independent of each other, and duplicates the input power system.

To use a single-phase dual power feed configuration for the SPARC Enterprise M8000 server, mount the rack-mountable dual power feed option in the rack space itself. This requires a rack space with a height of 6 RUs in the cabinet. For the SPARC Enterprise M9000 server, you must add the power cabinet.

For three-phase power feed in either server, an additional power cabinet is required. Install one power cabinet for each SPARC Enterprise M8000/M9000 Server.

For details, see the SPARC Enterprise M8000/M9000 Servers Site Planning Guide.

Note - A three-phase power feed option can be installed only at the factory before shipment. A single-phase power feed cannot be changed to a three-phase power feed, or vice versa, after shipment from the factory.

Specifications of the Power Cabinet and M8000/M9000 Dual Power Feed Option

Item		Rack-mountable Dual Power Feed options	Power Cabinet
Outside dimensions	Width [mm]	489	317
	Depth [mm]	1003	1244
	Height [mm]	278(6U)	1800
Weight [kg]		75	350
Input power: Single-phase power input	Voltage [V]	AC200 to 240 ± 10%	
	Number of phases	Single phase	
	Frequency [Hz]	50/60 +2%, -4%	

External I/O Expansion Unit

The External I/O Expansion Unit is an optional product used to add PCI slots. The External I/O Expansion Unit has a height of four RUs (rack units), about 18 cm, in a 19-inch rack.

The External I/O Expansion Unit can accommodate up to two I/O Boats by using either six PCIe slots or six PCI-X slots.

- PCIe slots in each I/O Boat: short size to long size (to 312 mm)
- PCI-X slots in each I/O Boat: short size to long size (to 312 mm)

Also, active addition and replacement is enabled for all slots in the External I/O Expansion Unit.

SPARC Enterprise M9000 Server (Expansion Cabinet) Option

A SPARC Enterprise M9000 Server (base cabinet) configuration can contain up to 32 CPU Modules (64 cores), up to 2TB of memory, and up to 224 PCI slots. A configuration containing more components than described above would require the expansion cabinet option of the SPARC Enterprise M9000 Server.

A configuration with the SPARC Enterprise M9000 Server (expansion cabinet) can contain up to 64 CPU modules (128 cores), up to 4TB of memory, and up to 288 PCI slots.

Software Features

The SPARC Enterprise M8000/M9000 Servers use XSCF for system administration and monitoring.

The Solaris Operating System can be installed as the operating environment used in a domain.

Sun SPARC Enterprise Architecture Overview

Sun SPARC Enterprise Architecture Overview

The Jupiter Interconnect

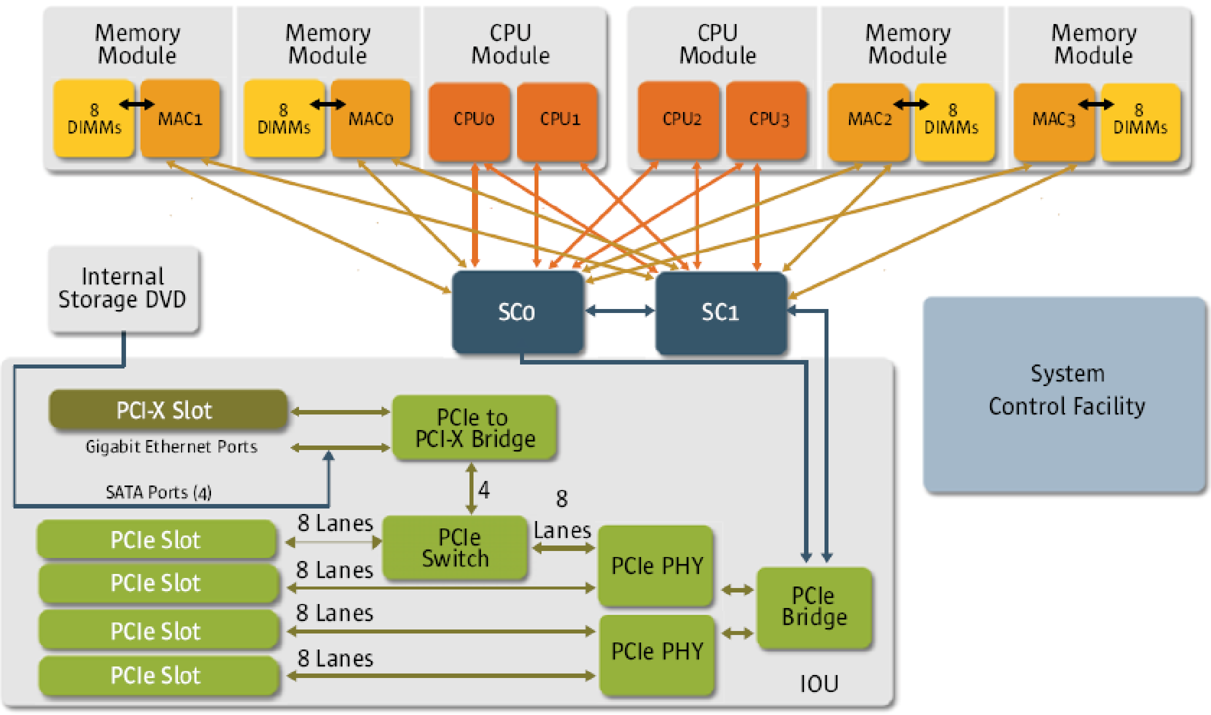
The Jupiter interconnect is a high-speed system interconnect between the CPU, memory, and I/O subsystems in both the mid-range and high-end servers. It provides superior memory and I/O bandwidth, which helps the SPARC64 VI, or Olympus-C processor deliver superior performance.

The Jupiter interconnect provides 7.5 times more system bandwidth than the previous generation of servers. Its maximum theoretical bandwidth is 304.2 Gbytes per second with a latency of 258 ns for local transactions and 498 ns for remote transactions.

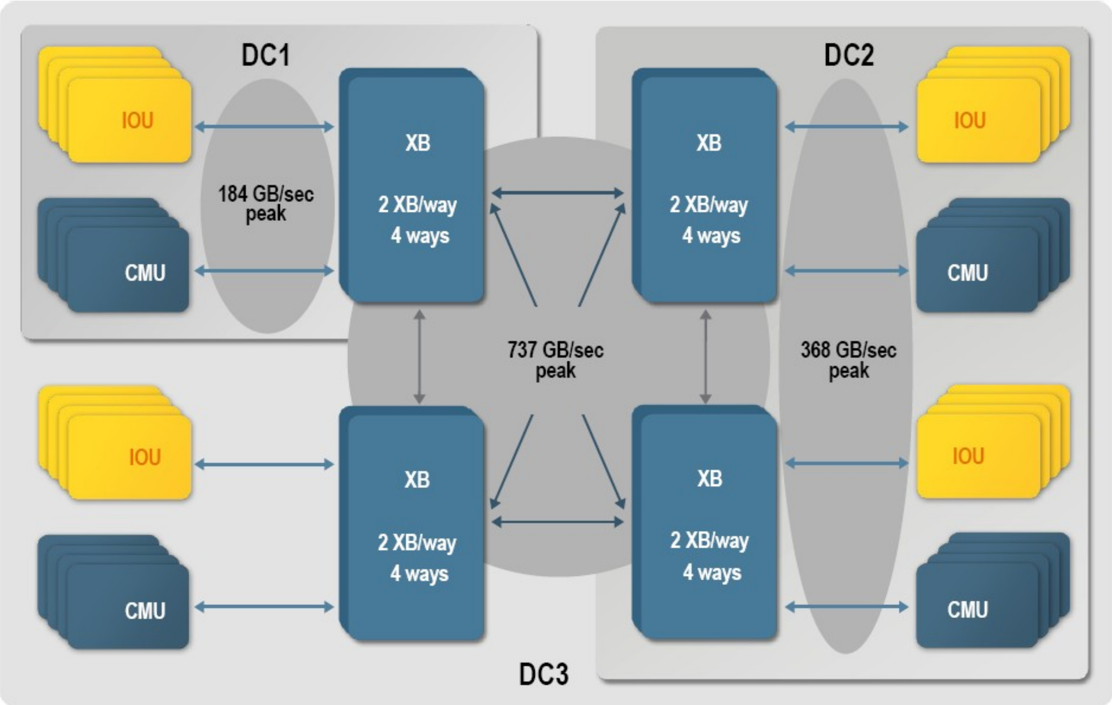
The Jupiter interconnect is central to the architecture found in both the mid-range and high-end servers.

The Jupiter interconnect performs the following functions:

- Allows the system to be divided into logically isolated domains
- Enables hot-plugging and unplugging of individual boards



DC Backplane Interconnect



	Theoretical Peak System Bandwidth[a] (GB/second)	Snoop Bandwidth (GB/second)	Stream Benchmark Triad Results (GB/second)	Stream Benchmark Copy Results (GB/second)	Theoretical Peak I/O Bandwidth[b] (GB/second)
Sun SPARC Enterprise M4000 Server	32	129	12.7	12.5	8
Sun SPARC Enterprise M5000 Server	64	129	25.2	24.8	16
Sun SPARC Enterprise M8000 Server	184	245	69.6	60.3	61
Sun SPARC Enterprise M9000-32 Server	368	245	134.4	114.9	122
Sun SPARC Enterprise M9000-64 Server	737	245	227.1	224.4	244

a.Theoretical Peak System Bandwidth is calculated by multiplying the bus width by the frequency of the bus between the system controller and the memory access controller.
b.Theoretical Peak I/O Bandwidth is calculated by multiplying the bus width by the frequency of the bus between the system controller and the PCI bridge.

Functionality

The Jupiter interconnect provides a connection between the interconnect devices (SPARC64 VI processors, memory, and PCI bridges) and the data path. The interconnect devices are interfaced to the data path using the system controller (SC) ASIC.

CPU and Memory Board Operational Overview

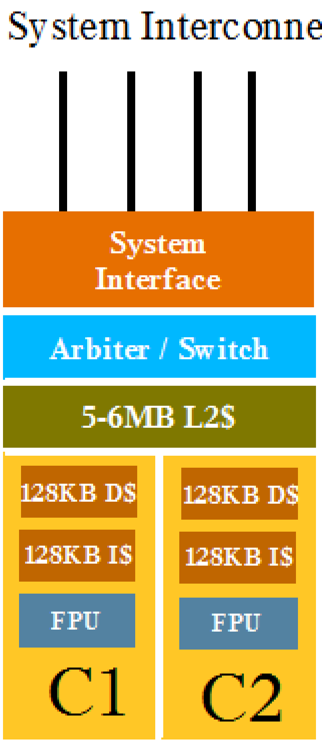
CPU and memory are organized differently on the mid-range and highend servers. In the mid-range servers, CPUs reside on CPU modules (CPUMs) and memory resides on memory boards (MEMBs). There are two distinct boards in the mid-range servers. In the high-end servers, both

the CPUs and memory reside on a CPU memory unit (CMU). Both the mid-range and high-end servers support the same type and speed of CPUs and the same type and sizes of DIMMs, they just reside on different boards.

The SPARC64® VII Processor Differences for the Sun SPARC® Enterprise MX000 Servers

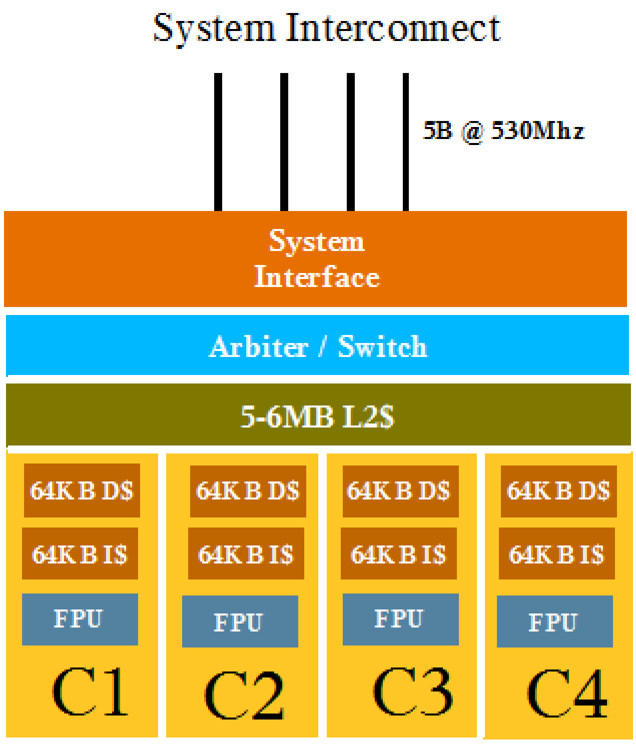
The SPARC64® VII processor, also known as Jupiter, is a 4-core processor upgrade for customers currently running SPARC64 VI, or Olympus, processors in the Sun SPARC® Enterprise MX000 servers. The SPARC64 VII processor is supported in the Sun SPARC Enterprise M8000 and M9000 servers running either the 1070 or 1071 firmware and in the Sun SPARC Enterprise M4000 and M5000 servers running the 1071 firmware.

The SPARC64 VI Processor



The SPARC64 VI processor, Olympus, consists of two SPARC V9 cores running at 2.15 to 2.4 gigahertz (GHz). They export the Sun4U™ architecture to the Solaris™ OS and run two vertical threads per core. Each core contains 128 kilobytes (Kbytes) of Instruction cache and 128 Kbytes of Data cache. The two cores share an on-chip Level 2 (L2) cache.

The SPARC64 VII Processor



The SPARC64® VII processor, Jupiter, consists of four SPARC® V9 cores running at 2.4 to 2.52 gigahertz (GHz). They export the Sun4U™ architecture to the Solaris™ OS and run two vertical threads per core. Each core contains 64 kilobytes (Kbytes) of Instruction cache and 64 Kbytes of Data cache. The four cores share an on-chip L2 cache.

Supported Firmware and Software Versions

The following table lists the supported firmware and software versions to run the SPARC64® VII processors in the Sun SPARC® Enterprise MX000 servers:

Software or Firmware	Version
XSCF Control Package for SPARC64 VII processors	XCP 1071
Solaris™ Operating System for SPARC64 VI processors	Solaris 10 11/06, with required patches
Solaris Operating System for SPARC64 VII processors	Solaris 10 5/08, or Solaris 10 8/07, with required patches

Limitations for the SPARC64 VII Processors

Upgrading a Sun SPARC® Enterprise MX000 server to SPARC64® VII processors must be completed with a cold swap. The XCP firmware must be upgraded to 1071 prior to inserting any SPARC64 VII processors into the chassis.

The combination of SPARC64 VI and SPARC64 VII processors in a Sun SPARC Enterprise MX000 server is supported beginning in the 1071 release of firmware.

Do not exceed a domain size of 256 virtual processors in a single Solaris™ domain. This is the equivalent of 32 CPUs in a single domain configuration. There is potential for the domain to hang under certain situations. Refer to the Product Notes for XCP Version 1071 for more information.

The `setdomainmode` and `showdomainmode` Commands

The `setdomainmode` and `showdomainmode` commands have been updated in the 1071 firmware to support mixed CPU configurations.

The `setdomainmode` command sets the mode of operation for the specified domain. The new mode of operation is CPU Mode, which determines the CPU operational mode mounted on the domain. The CPU operational mode can be automatically determined at domain startup, or it can be manually set to the compatible mode. The default is to let it be automatically determined at domain startup.

The CPU operational mode includes the following two types:

- SPARC64 VII enhanced mode - Operates using the enhanced functions of the SPARC64 VII processor. This mode is automatically set when the domain consists only of SPARC64 VII processors unless compatible mode is manually set.

- SPARC64 VI compatible mode - All the mounted CPUs operate with the functions equivalent to the SPARC64 VI processor. This mode can be set to a domain of any CPU configuration.

Note – This function cannot be specified for a domain which is powered on.

When cpumode is specified for function, one of the following can be specified for mode:

- auto - Automatically determines the operational mode of CPU at domain startup. Depending on the CPU configuration of the domain, any of the following CPU operational modes is set:
  - Consists only of SPARC64 VII processors: SPARC64 VII enhanced mode
  - SPARC64 VII and VI processors mixed: SPARC64 VI compatible mode
  - Consists only of SPARC64 VI processors: SPARC64 VI compatible mode
- compatible - Regardless of the CPUs mounted, sets the operational mode of CPU to the SPARC64 VI compatible mode.

  When adding an eXtended System Board (XSB) through a Dynamic Reconfiguration (DR) operation, the value of cpumode is referenced to determine which type of board can be added. The results are shown in the following table:

Domain CPU configuration	**Value of CPU Mode**	**Current CPU operational mode**	**CPU configuration of an XSB which can be added by a DR operation**
SPARC64 VII	auto	SPARC64 VII enhanced mode	SPARC64 VII
SPARC64 VII	compatible	SPARC64 VI compatible mode	Any CPU configuration
SPARC64 VII/ VI	auto or compatible	SPARC64 VI compatible mode	Any CPU configuration
SPARC64 VI	auto or compatible	SPARC64 VI compatible mode	Any CPU configuration

- To add in an XSB other than those mentioned above, you need to perform the domain reconfiguration accompanied by the domain power off/on or reboot.

  To check the mode of CPUs which is currently set from within the domain, execute the `prtdiag` command from the Solaris™ OS.

  The `showdomainmode` command displays the modes of operation for the specified domain. The new state that is displayed is the CPU Mode. The value of CPU Mode determines the operational mode of the CPU mounted on the domain. One of the following

is displayed:

- on - Automatically determined at domain startup
- off - Set to the SPARC64 VI compatible mode regardless of the CPUs mounted.

SPARC64 VI Microprocessor Memory

The DIMM modules supported in these servers are high-capacity, dual side-mounted units. They are Double Data Rate II, DDR II, DIMMs. The supported DIMM sizes are:

- 1-Gbyte DIMMs
- 2-Gbyte DIMMs
- 4-Gbyte DIMMs (stacked and non-stacked modules)
- 8-Gbyte DIMMs (currently in progress)

OPL uses Memory Groups.

XSBs can access 2 groups, Group A and Group B.
Group A must always be populated, Group B can optionally be populated to increase memory capacity.
OPL automatically configures memory interleaving to obtain the best performance.
Interleaving takes place within a XSB (UNI or QUAD).
All DIMMs within a XSB are included in a single interleaving scheme, there is only one interleave factor defined inside a XSB.
This has the consequence that the number of DIMMS in a Group can only be 4, 8 or 16 and that the number of DIMMs in Group B must be either 0 or the same as the number of DIMMs in Group A
Populating Group B does not affect interleaving or mirroring, it only increases the memory capacity.

Interleave factor = 2	4 DIMMS in Group A	optionally 4 DIMMs in Group B	UNI-XSB or QUAD-XSB
Interleave factor = 4	8 DIMMS in Group A	optionally 8 DIMMs in Group B	UNI-XSB
Interleave factor = 8	16 DIMMS in Group A	optionally 16 DIMMs in Group B	UNI-XSB

Note: Interleave factor of 3 is not possible, therefore XSBs with 12 DIMMS (or 24 DIMMs) are not permitted.
Note: By definition, a QUAD-XSB can only hold 4 DIMMs in Group A and optionally 4 DIMMS in Group B.

Memory can be configured in mirror mode for higher reliability.
In mirrored mode, both the the memory capacity and the the interleave factor are halved.

The minimal hardware required for a functioning XSB (UNI or QUAD) is to have at least 1 CPU and at least 4 DIMMs in Group A.

DIMM naming scheme and physical location

The DIMM names as output by the showhardconf command and as named on the FRUs is as follows:

		Physical System Board nn (PSB)					
UNI-XSB mode	QUAD-XSB mode	M4000 / M5000				M8000 / M9000	
XSB#	XSB#	Group A		Group B		Group A	Group B
nn-0	nn-0	MEMB#0 or MEMB#4	MEM#0A MEM#1A MEM#2A MEM#3A	MEMB#0 or MEMB#4	MEM#0B MEM#1B MEM#2B MEM#3B	MEM#00A MEM#01A MEM#02A MEM#03A	MEM#00B MEM#01B MEM#02B MEM#03B
	nn-1	MEMB#1 or MEMB#5	MEM#0A MEM#1A MEM#2A MEM#3A	MEMB#1 or MEMB#5	MEM#0B MEM#1B MEM#2B MEM#3B	MEM#10A MEM#11A MEM#12A MEM#13A	MEM#10B MEM#11B MEM#12B MEM#13B
	nn-2	MEMB#2 or MEMB#6	MEM#0A MEM#1A MEM#2A MEM#3A	MEMB#2 or MEMB#6	MEM#0B MEM#1B MEM#2B MEM#3B	MEM#20A MEM#21A MEM#22A MEM#23A	MEM#20B MEM#21B MEM#22B MEM#23B
	nn-3	MEMB#3 or MEMB#7	MEM#0A MEM#1A MEM#2A MEM#3A	MEMB#3 or MEMB#7	MEM#0B MEM#1B MEM#2B MEM#3B	MEM#30A MEM#31A MEM#32A MEM#33A	MEM#30B MEM#31B MEM#32B MEM#33B

Applicable memory population rules

The rules are summarized in the 4 tables below and the additional Group rules.
The gray areas depict the hardware that can be installed.
It is important to understand that the rules apply per XSB.

UNI-XSB mode M4000 / M5000

PSB #	CPUM # installed	Resulting XSB #	MEMB # required	# of DIMMs on each MEMB		Resulting interleave Factor	
				Group A	Group B	Normal	Mirrored
0	0	00-0	0	4	0 or 4	2	1
	0 and 1		0 and 1			4	2
			0,1,2 and 3			8	4
1	2	01-0	4	4	0 or 4	2	1
	2 and 3		4 and 5			4	2
			4,5,6 and 7			8	4

Note: PSB1 only exists in M5000.

QUAD-XSB mode M4000 / M5000							
PSB #	CPUM # installed	Resulting XSB #	MEMB # required	# of DIMMs on each MEMB		Resulting interleave factor	
				Group A	Group B	Normal	Mirrored
0	0 *	00-0	0	4	0 / 4	2	1
		00-1	1	4	0 / 4	2	1
	1	00-2	2	4	0 / 4	2	1
		00-3	3	4	0 / 4	2	1
1	2 *	01-0	4	4	0 / 4	2	1
		01-1	5	4	0 / 4	2	1
	3	01-2	6	4	0 / 4	2	1
		01-3	7	4	0 / 4	2	1

*Note: Install these first.
Note: PSB1 only exists in M5000.
Note: Each PSB can individually be set to UNI-XSB or QUAD -XSB mode.

UNI-XSB M8000 / M9000					
PSB nn	XSB #	DIMM quantity on each CMU		Resulting interleave factor	
		Group A	Group B	Normal	Mirrored
nn= 0..16	nn-0	16	0	8	4
			16		

QUAD-XSB M8000 / M9000				
PSB nn	XSB #	DIMM quantity on each CMU		Resulting interleave factor
		Group A	Group B	Normal
nn= 0..16	nn-0 nn-1 nn-2 nn-3	16	0	2
			16	

Note: Each PSB can individually be set to UNI-XSB or QUAD -XSB mode.
Note: For architectural reasons, M8000 / M9000 do not allow memory mirroring in QUAD-XSB mode.

Additional Group Rules

within a XSB (UNI or QUAD), the following rules apply in addition to the above 4 tables:

1. All DIMMs within a Group (A or B) must be of the same size / rank
2. The size of the DIMMs in Group B must be smaller than or equal the size of the DIMMs in Group A.
3. The number of DIMMs in Group B must be either 0 or the same as the number of DIMMs in Group A

Additional considerations

Implication of the above rules for M4000 / M5000

1. Half populated MEMB, with only Group A populated are supported.
2. In UNI-XSB mode, MEMBs must be installed in powers of 2 (1,2 or 4).
   3 MEMBs is not possible, this is due to the single interleaving scheme used on an XSB.
3. It is permitted to have 3 MEMBs on a PSB, as long as the PSB is configured in QUAD-XSB mode.
4. The minimum requirement for UNI-XSB mode is CPUM#0 / MEMB#0 (and CPUM#2 / MEMB#4)
5. A CPU on a CPUM without its associated MEMB and vice-versa cannot be used in QUAD-XSB mode.
   The “setupfru” command will report “Operation has completed. However, a configuration error was detected”. If you configure a PSB in QUAD-XSB mode and one of the QUAD-XSB is made of a CPU and no corresponding MEMB or vice-versa.
   In this case, "showboards" will report the QUAD-XSB as "Unmount".
6. XSBs can have different memory configurations.
7. Only identically configured QUAD-XSBs can be reconfigured into one UNI-XSB

Memory upgrade

The rule requiring that Group A contains the DIMMs with the higher capacity may dictate that in case of a memory upgrade, DIMMs from Group A must be moved to Group B and the new higher capacity DIMMs be installed in Group A.

Performance considerations

UNI-XSB mode allows higher memory performance because it can use higher interleave factors. If all resources of a PSB are needed in one domain, then it is advisable to configure the PSB in UNI-XSB mode.

RAS considerations

Memory mirroring is an effective way to protect against memory failures. Configuring an XSB for memory mirroring halves the available memory capacity. It also halves the interleave factor. Memory mirroring should therefore best be used in UNI-XSB mode.

Best Practice

Try to avoid mixed configurations. It is advisable to have all identical MEMBs in a PSB of a M4000 / M5000. This allows to change between UNI-XSB and QUAD-XSB mode without loosing maximum performance or having systems containing unusable hardware.

If the capability to switch between UNI-XSB and QUAD-XSB mode is desired, then both the rules for UNI-XSB and those for QUAD_XSB must be followed. The supported M8000 / M9000 configurations enforce this.

How to identify DIMMs inside a system from XSCF

The showhardconf command run on the XSCF display the type of DIMMs

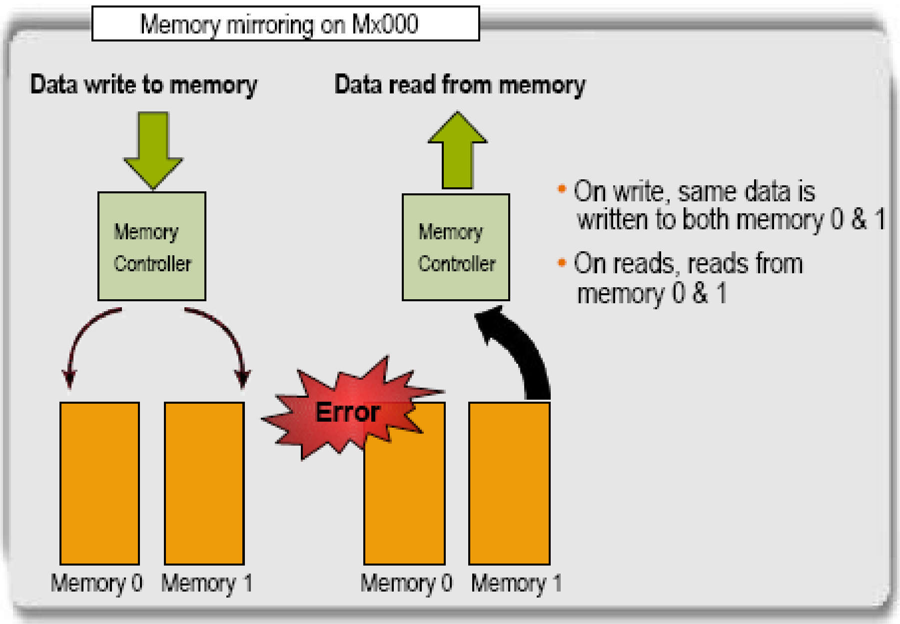
Type 1A = 1GB / rank1
Type 1B = 1GB / rank2
Type 2A = 2GB / rank1
Type 2B = 2GB / rank2
Type 4A = 4GB / rank1
Type 4B = 4GB / rank2

Memory Mirroring

Both the mid-range and high-end servers support memory mirroring. Memory mirroring operates by pairing DIMMs together for both reads and writes. Mirroring divides the available memory in half. Memory mirroring is turned off by default on all systems.

On writes, the data and ECC are written to both halves of the pair. On reads, data is read from both halves and the ECC is compared. Errors during memory mirroring are handled as follows:

- If both copies of the pair have correctable ECC and have matching data, the data is returned.
- If one copy has uncorrectable ECC and the other has correctable ECC, the data is returned.
- If both copies have uncorrectable ECC errors, an error data packet is returned.
- If both copies have correctable ECC, but the data does not match, an error data packet is returned.



Memory mirroring is supported both in uni- and quad-XSB mode in the mid-range servers. However, it is only supported in uni-mode on the high-end servers. This is because in the high-end server models, there is striping between the MACs (memory access controllers) on a board, where

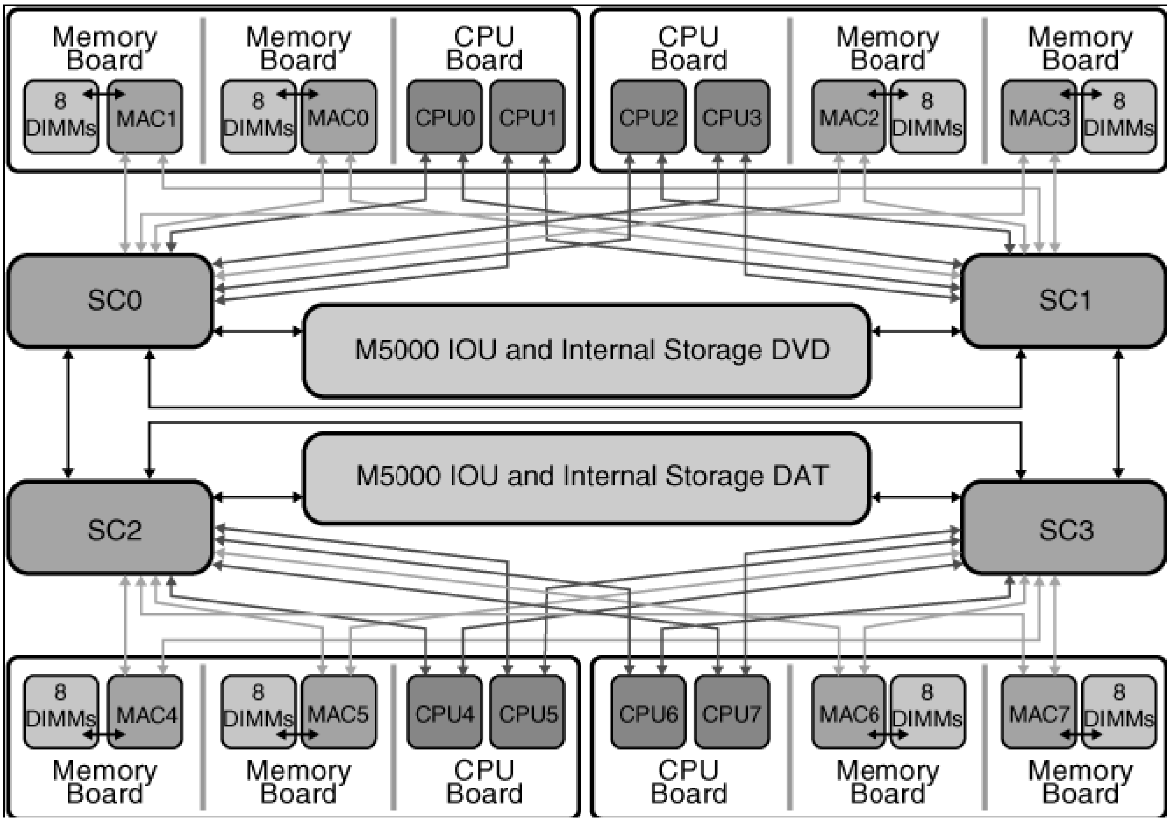
as in the mid-range server models there is no striping.

In the high-end models configured in quad-XSB mode, you get half of MAC0 and MAC2 for XSB-0. This does not allow the memory mirror mode because you can only mirror within a MAC.

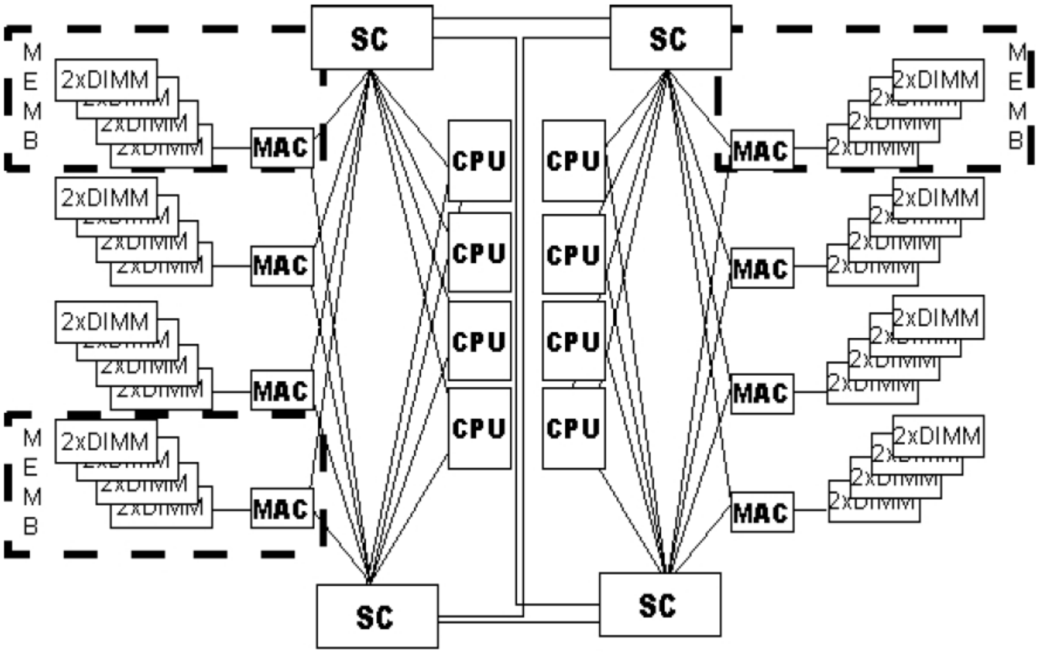
In the mid-range servers configured in quad-XSB mode, you get one full MAC per quad-XSB. This makes it possible for mirroring in the mid-range servers.

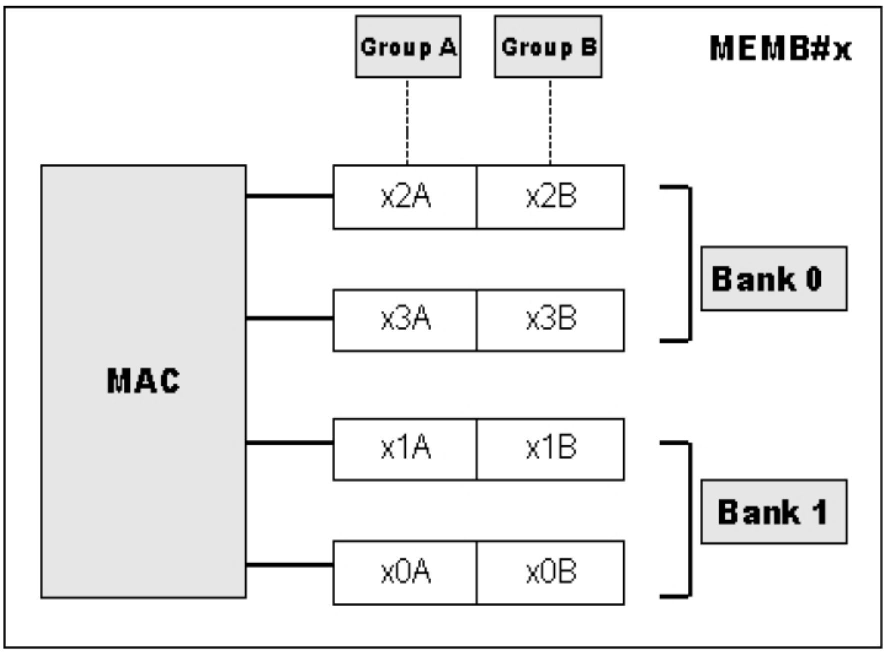
Memory Access Controller

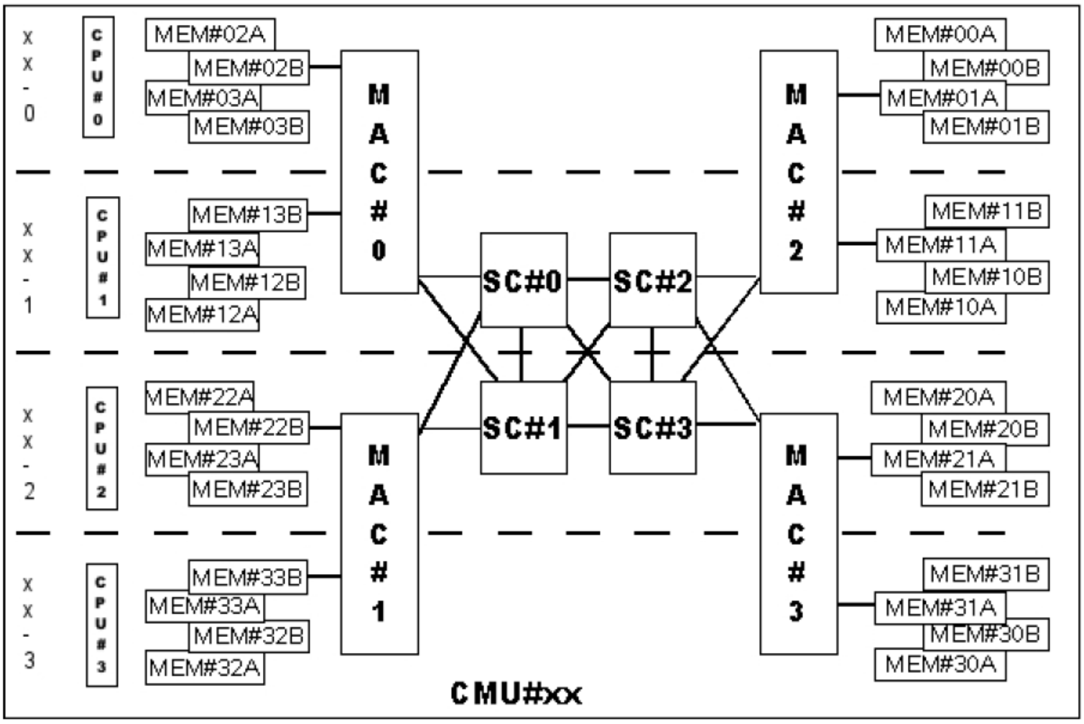
The memory boards (MEMBs) contain MACs in the mid-range servers and the CMUs contain MACs in the high-end servers. The MACs provide an interface from memory to the SC ASICs.

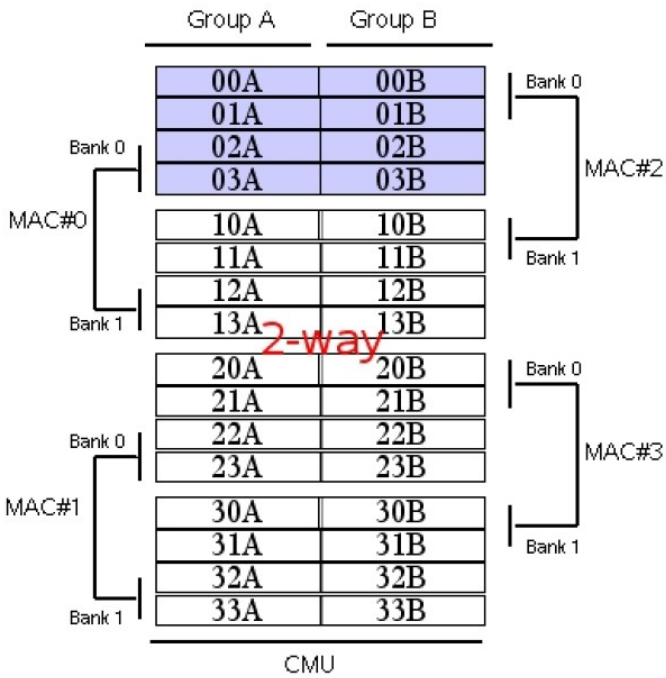


M4000/M5000 systems consist of 2 SCs per Mother Board Unit, 4 MEMBs per MBU.

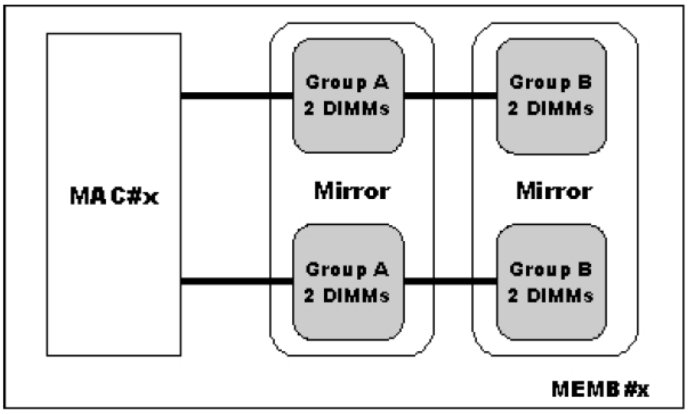





XX-0
CPU#0
MEM#02A
MEM#02B
MEM#03A
MEM#03B
XX-1
CPU#1
MEM#13B
MEM#13A
MEM#12B
MEM#12A
XX-2
CPU#2
MEM#22A
MEM#22B
MEM#23A
MEM#23B
XX-3
CPU#3
MEM#33B
MEM#33A
MEM#32B
MEM#32A
MAC#0
MAC#1
SC#0
SC#2
SC#1
SC#3
MAC#2
MAC#3
MEM#00A
MEM#00B
MEM#01A
MEM#01B
MEM#11B
MEM#11A
MEM#10B
MEM#10A
MEM#20A
MEM#20B
MEM#21A
MEM#21B
MEM#31B
MEM#31A
MEM#30B
MEM#30A
CMU#xx


Group A
Group B
00A
00B
01A
01B
02A
02B
03A
03B
10A
10B
11A
11B
12A
12B
13A
13B
20A
20B
21A
21B
22A
22B
23A
23B
30A
30B
31A
31B
32A
32B
33A
33B
2-way
Bank 0
Bank 1
MAC#0
MAC#1
MAC#2
MAC#3
CMU

Memory mirroring on M4000/M5000 servers is done at the MEMB level.
DIMMs from group A mirrored on DIMMs from group A.
DIMMs from group B mirrored on DIMMs from group B.



Memory mirroring on the M8000/M9000 servers is done at the CMU level due to the striping between MACs.

MEM#		***MEM#***	***MEM#***		***MEM#***
00A	***mirrored on***	10A	20A	***mirrored on***	30A
00B	***mirrored on***	10B	20B	***mirrored on***	30B
01A	***mirrored on***	11A	21A	***mirrored on***	31A
01B	***mirrored on***	11B	21B	***mirrored on***	31B
02A	***mirrored on***	12A	22A	***mirrored on***	32A
02B	***mirrored on***	12B	22B	***mirrored on***	32B
03A	***mirrored on***	13A	23A	***mirrored on***	33A
03B	***mirrored on***	13B	23B	***mirrored on***	33B

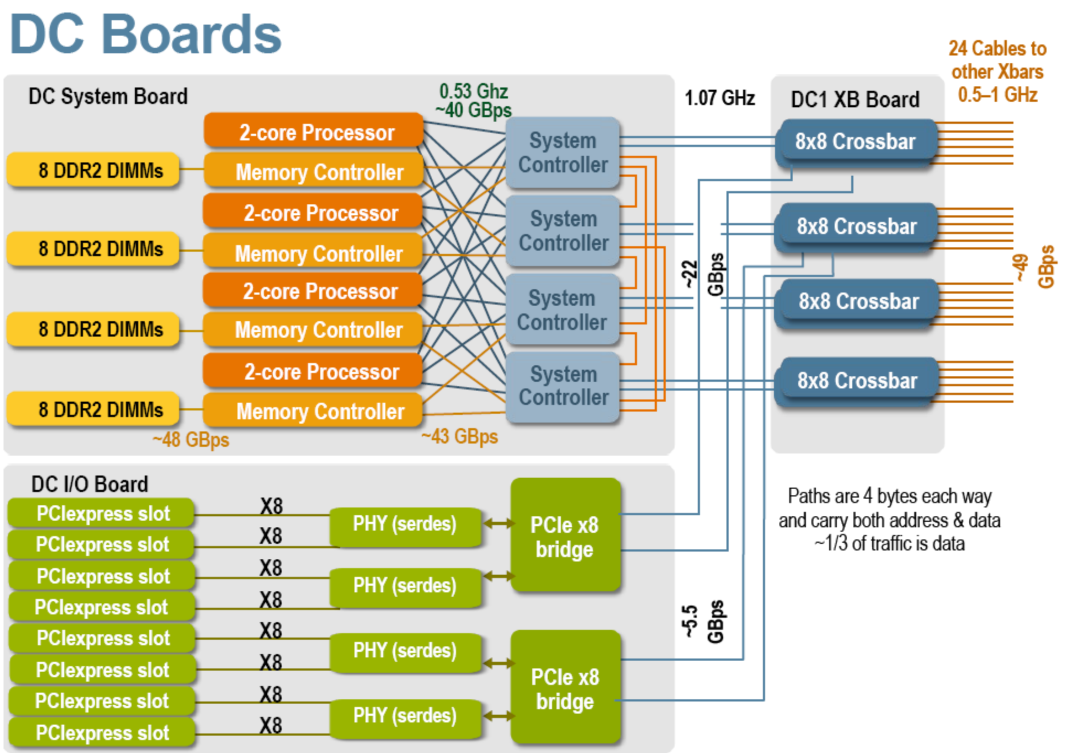
Summary of the memory mirroring, segments in memory and interleaving :

	M4000/M5000		***M8000/M9000***	
	Non-Mirror Mode	***Mirror Mode***	***Non-Mirror Mode***	***Mirror Mode***
4 segments	2-way	1-way	2-way	N/A
2 segments	4-way	2-way	4-way	2-way
1 segment	8-way	4-way	8-way	4-way

System Controller

The system controller, not to be confused with the service processor, is an ASIC that provides an interface between the MACs, the CPUs and the I/O controllers. The connection on the high-end servers goes through the crossbar units (XBUs). On the mid-range servers, the connection goes through the motherboard unit (MBU).

The SC and MAC ASICS can be seen on the CMUs found in the high-end servers.

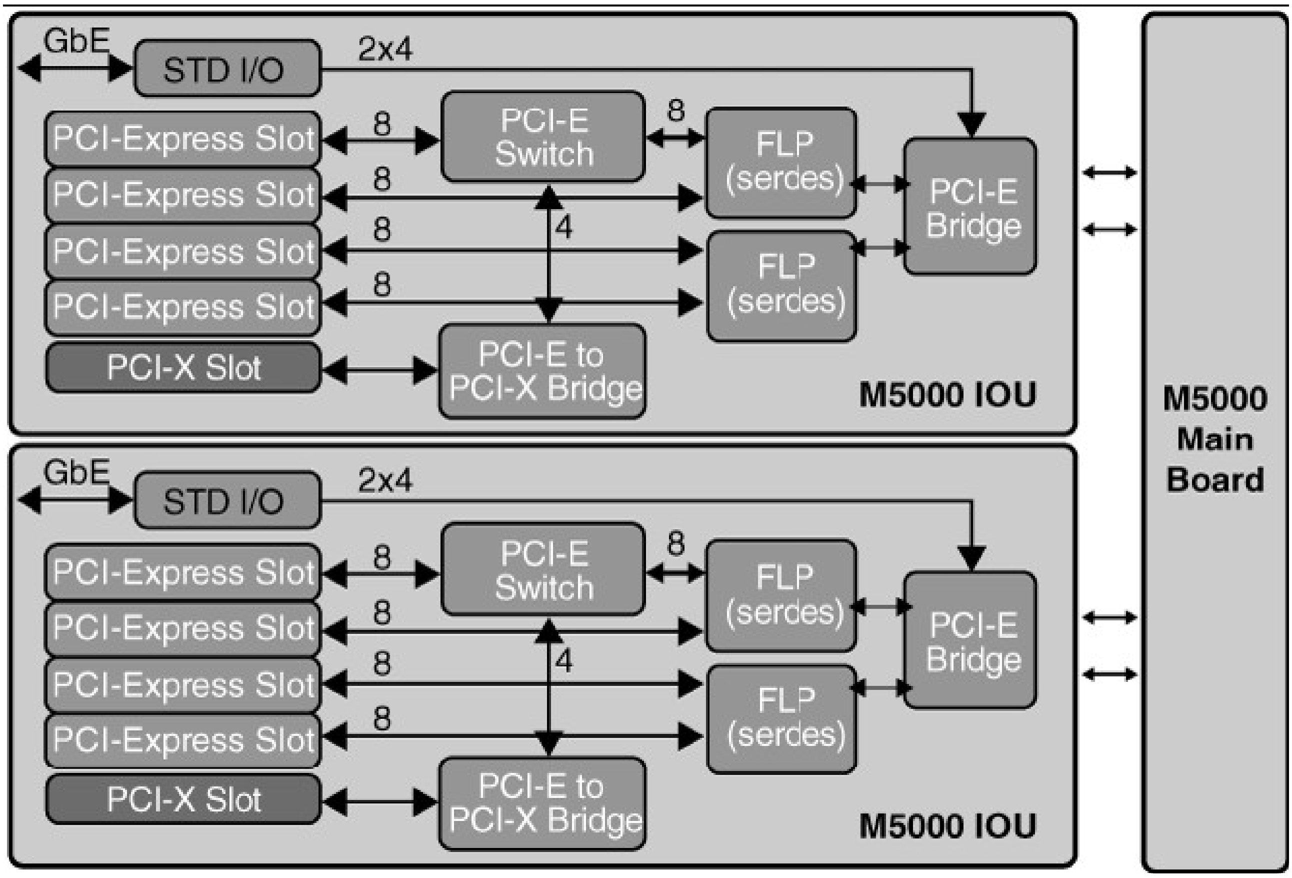


I/O Overview

The I/O boards in both the mid-range and high-end servers are called I/O units, or IOUs. However, they are different components and support different numbers and types of cards.

Mid-Range Server IOU

The IOU in the mid-range servers supports both PCI-Express and PCI-X cards. In the next figure you can see the layout of the IOUs in a M5000 server, which supports one or two IOUs. The M4000 server supports only a single IOU, so the figure is still applicable, with only half of the IOU resources shown.

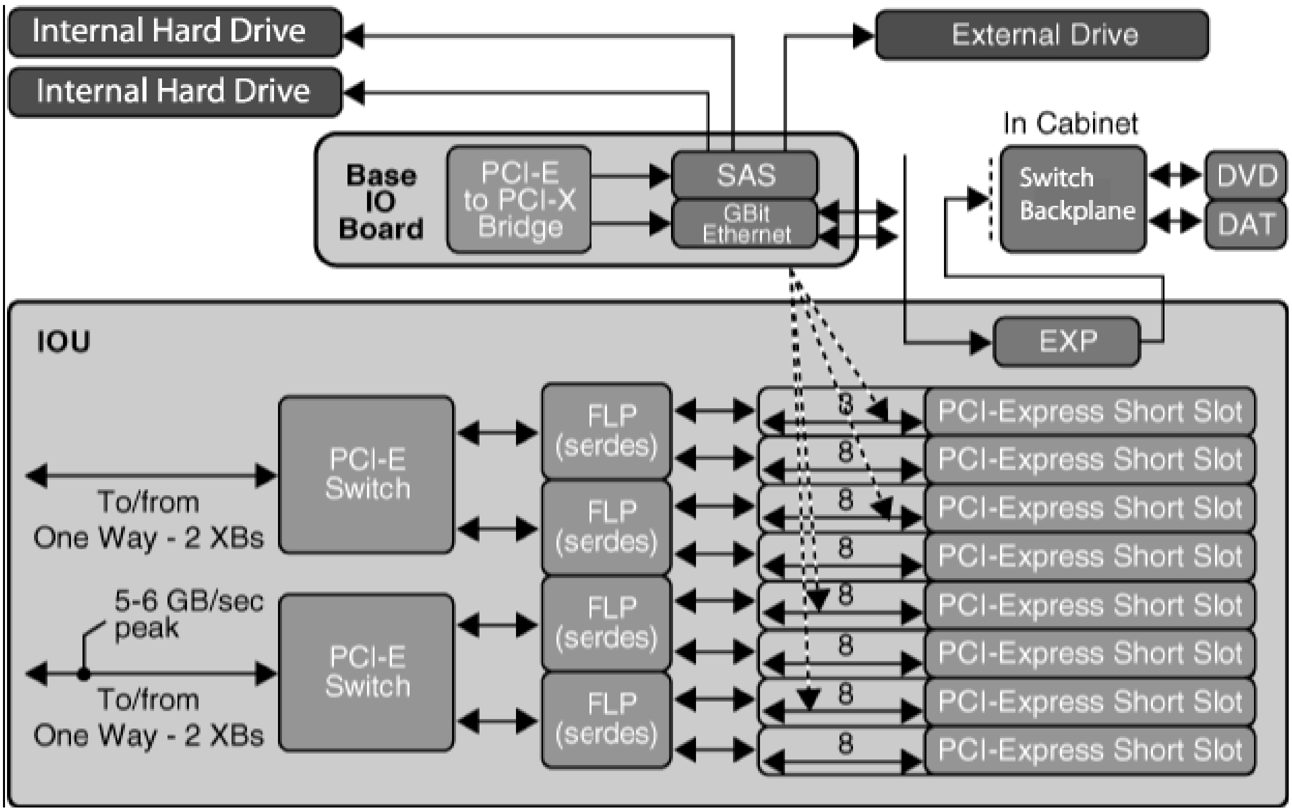


Each I/O unit contains the following:

- PCI cards – Four short PCIe (8-lane) slots (upper four slots) and one short PCI-X slot (133 MHz) (lowest slot)
- One I/O controller (IOC) chip which acts as the bridge chip between the system bus and the I/O bus
- PCIe switches or bridges connected to the slots

High-End Server IOU

The IOU in the high-end servers supports only PCIe cards. In the figure you can see the layout of the IOUs in a high-end server. All of the high-end servers use the same board.



Board Nomenclature

The boards in the MX000 servers are referenced with new names. Before configuring the system, you should be familiar with the following terms:

- Physical System Board (PSB) – Consists of CPU, memory, and I/O
- eXtended System Board (XSB) – Allows you to configure your PSB as a uni-board (00-0) with all of the components assigned to it or a quad-board (00-0, 00-1, 00-2, 00-3) with the components being divided

The Mid-Range Servers

The M4000 server contains one PSB. The M5000 server contains two PSBs.

Each PSB consists of:

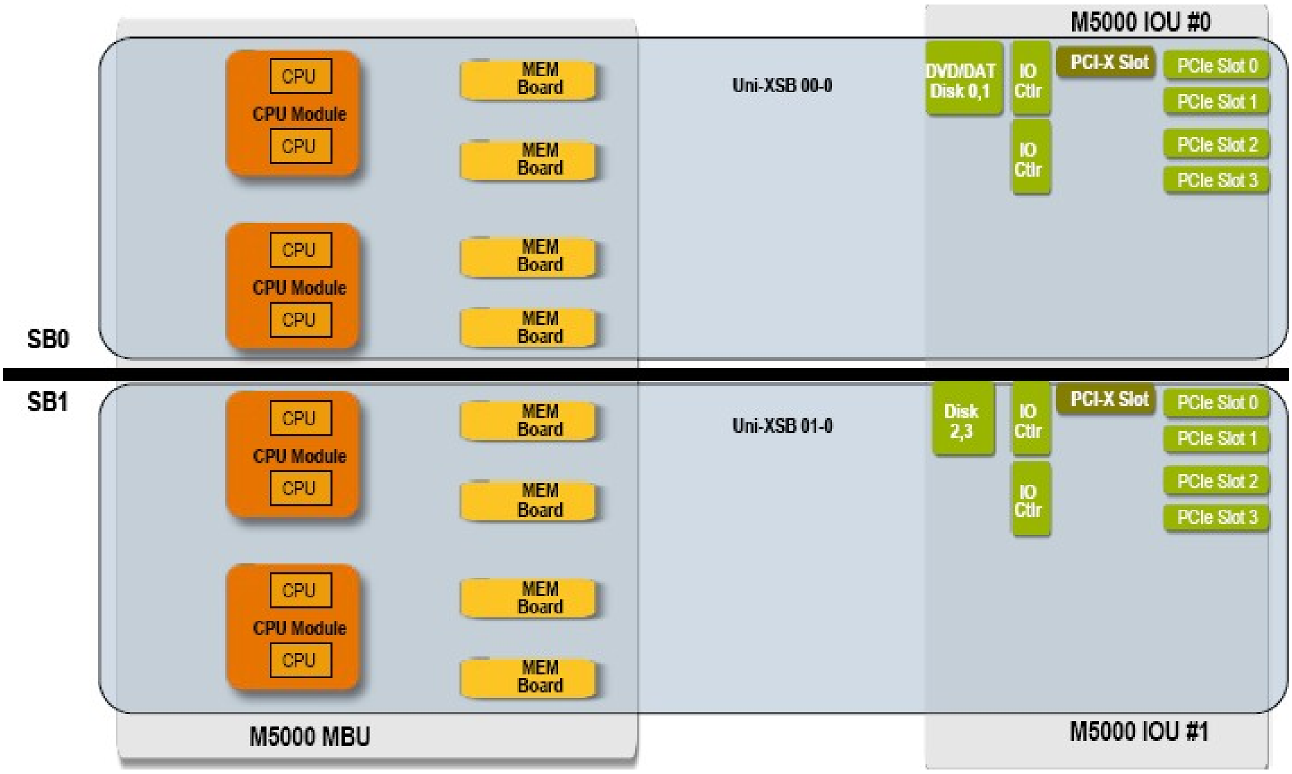
- One IOU containing:
  - One PCI-X slot
  - Four PCIe slots
  - Built-in I/O (two disks, two GbE ports and DVD/DAT)
  - Two CPU modules (CPUMs) containing two CPUs each
  - Four MEMBs containing eight DIMMs each

Configuring a PSB as a quad-board results in the following XSBs:

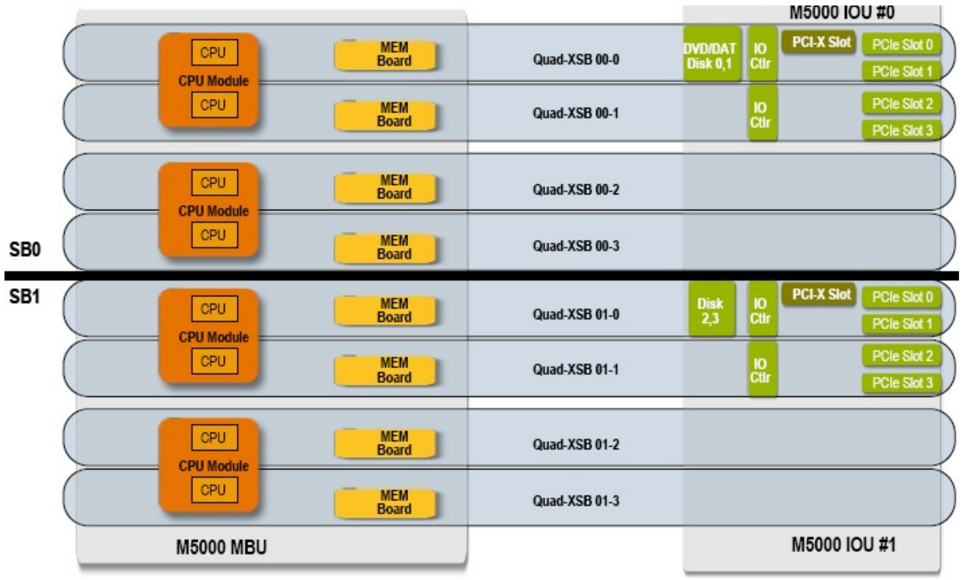
- XSB XX-0 containing:
  - One CPU
  - One MEMB containing eight DIMMs
  - The PCI-X slot 0
  - Two PCIe slots (1 and 2)
  - Built-in I/O (two disks and two GbE ports and DVD and optional DAT)

- XSB XX-1 containing:
    - One CPU
    - One MEMB containing eight DIMMs
    - Two PCIe slots (3 and 4)
- XSB XX-2 containing:
    - One CPU
    - One MEMB containing eight DIMMs
- XSB XX-3 containing:
    - One CPU
    - One MEMB containing eight DIMMs

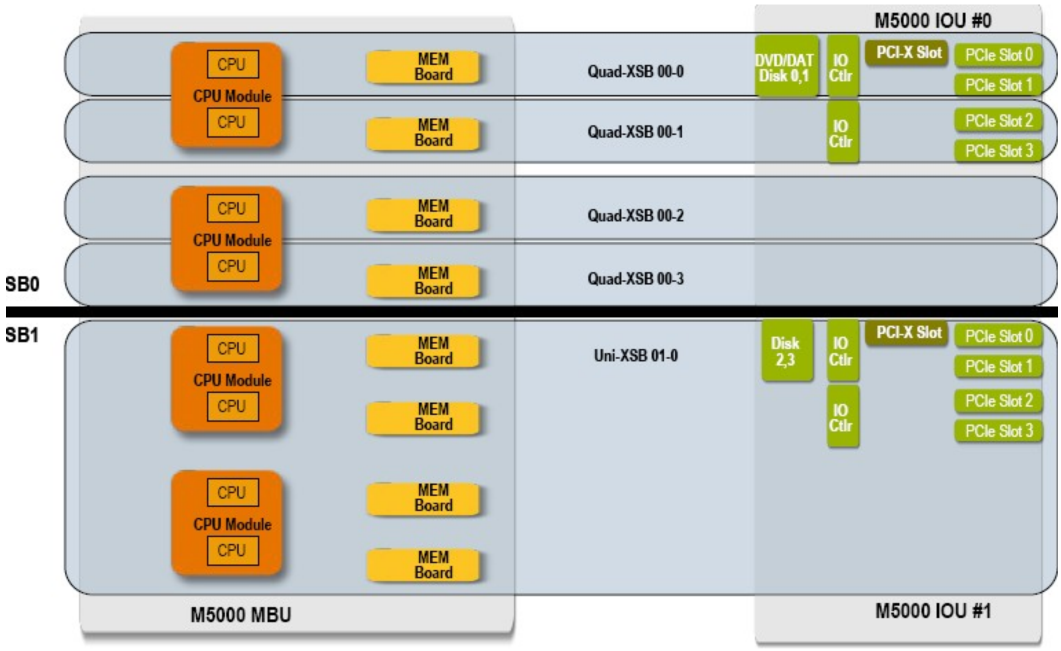
M5000 system with both SB's in UNI mode



M5000 system with both SB's in Quad mode



M5000 system with SB0 in Quad and SB1 in Uni mode.



The High-End Servers

The M8000 server contains four PSBs. The M9000 server contains eight PSBs. The M9000-64 server contains sixteen PSBs. Each PSB consists of:

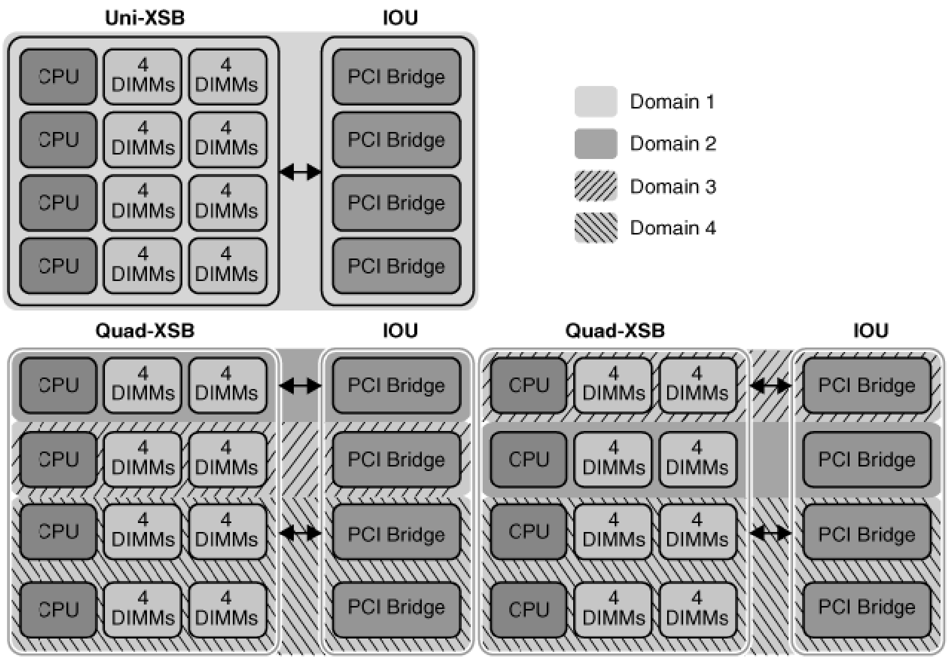
- One IOU containing:
    - Eight PCIe slots
    - Built-in I/O (four disks)
    - One CPU Memory Unit (CMU) containing:
    - Four CPUs
    - 32 DIMMs

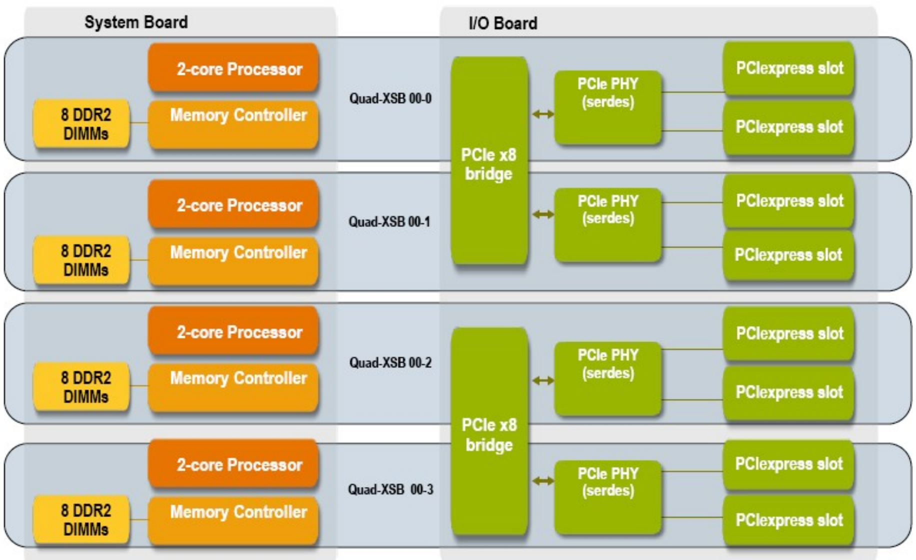
Configuring a PSB as a quad-board results in the following XSBs:

- XSB XX-0 containing:
    - One CPU (CPU0)
    - The CPU's associated memory, consisting of eight DIMMs
    - Two PCIe slots (0 and 1)
    - Built-in I/O (two disks, HDD 0 and HDD 1)
- XSB XX-1 containing:
    - One CPU (CPU1)
    - The CPU's associated memory, consisting of eight DIMMs
    - Two PCIe slots (2 and 3)
- XSB XX-2 containing:
    - One CPU (CPU2)
    - The CPU's associated memory, consisting of eight DIMMs
    - Two PCIe slots (4 and 5)
    - Built-in I/O (two disks, HDD 2 and HDD 3)
- XSB XX-3 containing:
    - One CPU (CPU3)
    - The CPU's associated memory, consisting of eight DIMMs
    - Two PCIe slots (6 and 7)

The same pattern holds true for the remaining PSBs when you quad them.

The following figure shows a combination of uni-XSB and quad-XSBs divided among four domains in a high-end server.



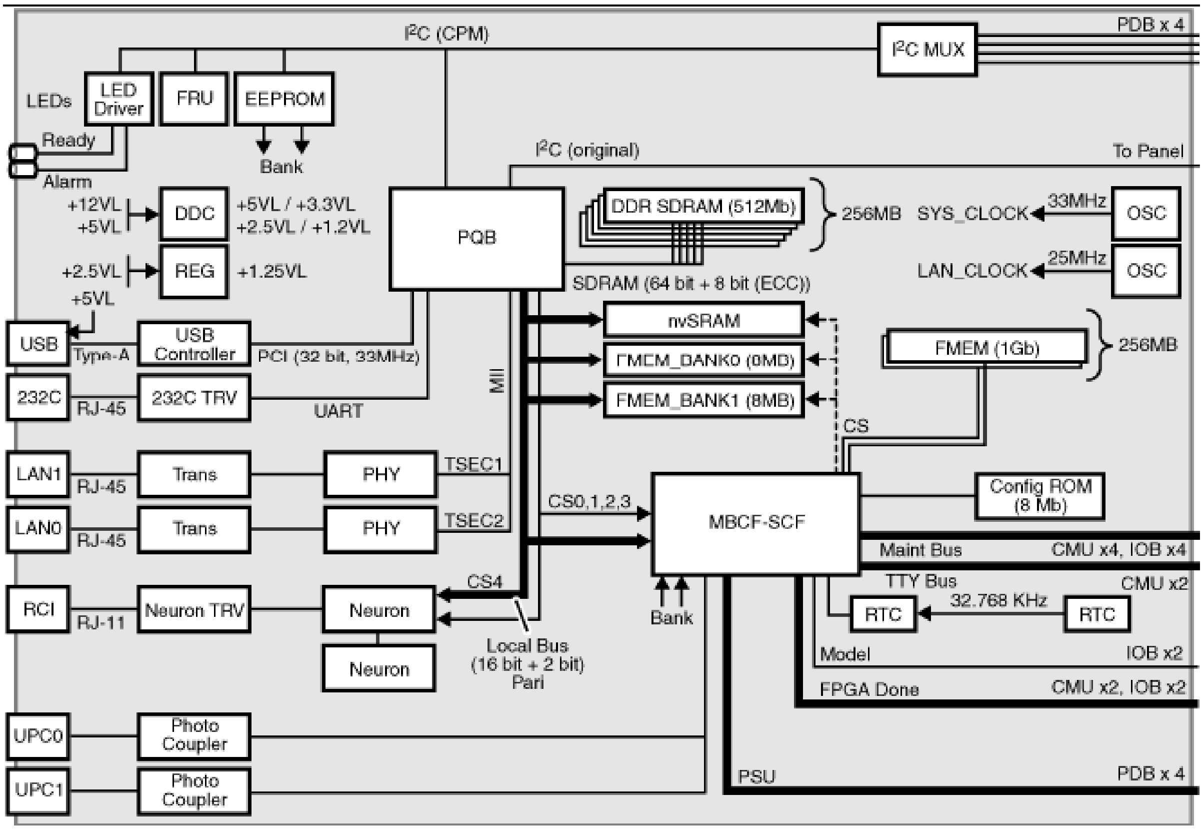


Service Processor Hardware Architecture

The service processor is comprised of a variety of electrical components, and, in effect, is a small computer unto itself. This section describes the service processor components and their functions.

Service Processor Block Diagram

The figure provides a functional block diagram of the service processor used in the MX000 servers.



Component	Details
Processor	Freescale MPC8541E PowerQUICC III CPU • 64 kilobyte (KB) L1 cache (32-KB I-cache and D-cache) • 256-KB L2 cache • Core speed: 533MHz • Supports 32-bit PCI bus, I2C bus, Local Bus, and SDRAM bus
FPGA	Lattice Field Programmable Gate Array (FPGA) • Known as the MBCF-SCF (maintenance bus control) • Interfaces to the MPC8541E local bus, maintenance bus, and TTY bus • Monitors the PSU and UPS • Operating frequency: 340 MHz • Operating voltage: 1.14v to 1.26v
Main memory	Micron MT46V32M16P-6T:F • DDR-SDRAM: 256 Mbytes (MB) • 8 MB x 16 x 4 banks • Provides 64 bits of data • Provides 8 bits of ECC • Operating frequency: 133 MHz

Component	Details
FMEM flash memory	Spansion S29JL064H70TFI000 • 8 Mbytes • 64 Megabits (Mbits) (x2) • Uses two banks of memory, one for backup • Operating voltage: 3v
Maintenance bus	Acts as the communication mechanism for various components and provides: • I^2C master control • JTAG controller functionality • Power supply monitoring • Interrupt handling • Reset control
Ports	The following ports are provided: • USB 1.1 (x1) • 10/100Base-T (x2) • Serial port (x1) • Uninterruptable power control (UPC) (x2) • RCI (x1) not used by Sun
Clock	Epson Q414574B1000102 • High-accuracy crystal real-time clock • Automatic leap year adjustment

Extended System Control Facility Functions

Extended System Control Facility Functions

The MX000 servers all use the Extended System Control Facility (XSCF) to provide system monitoring and control. The XSCF consists of a hardware component called the Extended System Control Facility unit (XSCFU) and a software component called the XSCF control package (XCP).

Note – For simplicity, the XSCFU is also referred to as the service processor, and is referred to as such for the remainder of this module.

Service Processor Functionality

The main functions provided by the service processor are:

- Platform monitoring and configuration management
- Security management
- Server status reporting
- Error detection
- Remote server control
- Resource management
- DR
- Capacity on Demand (COD)

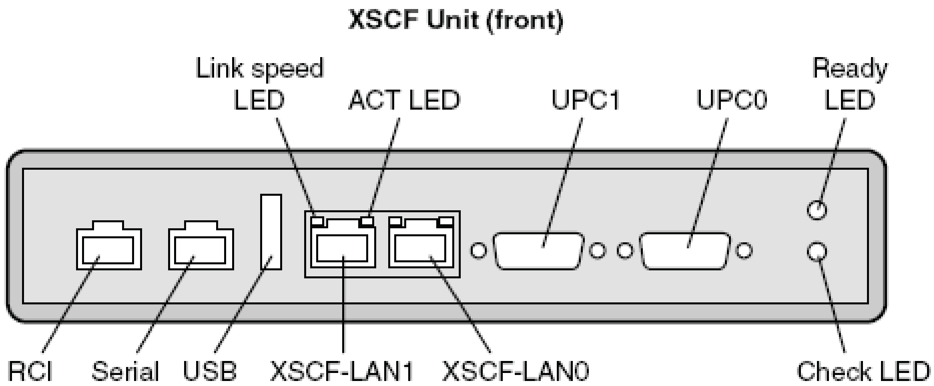
Comparing Service Processors

Although the functionality of the service processor is shared among all of the servers in the MX000 server line, there are some differences between the service processor functionality available in the high-end and midrange servers.

M4000 and M5000 Servers

The mid-range servers use only one service processor (XSCFU board), with the following characteristics:

- No redundancy is provided.
- Not hot-swappable. The server must be powered off to replace the service processor (XSCFU board).

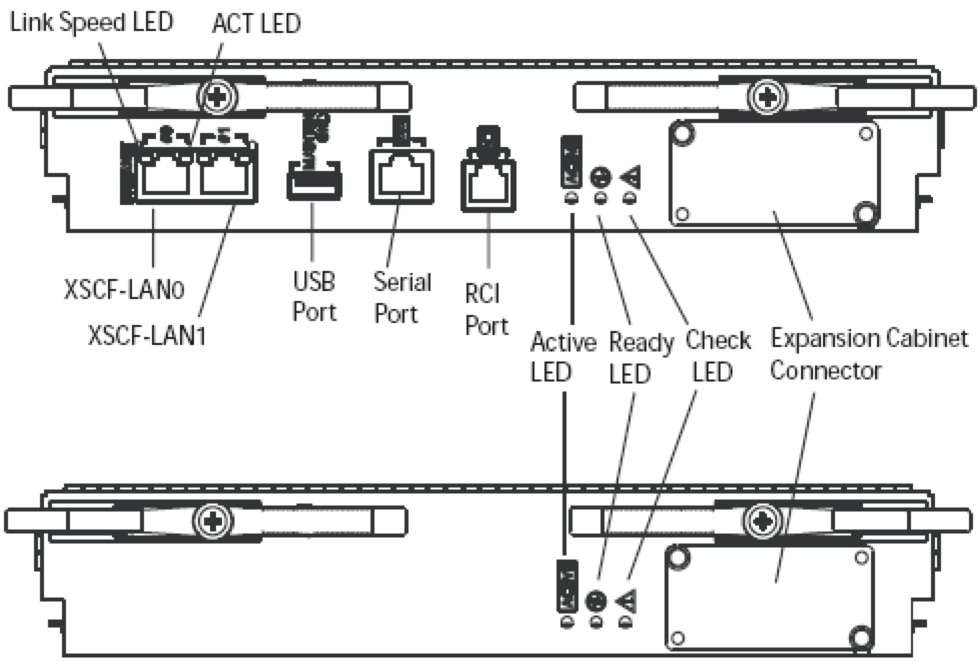


M8000 and M9000 Servers

The high-end servers' service processors have the following characteristics:.

- Dual service processors (XSCFU_B).
- The service processors act as redundant components.
- Hot swap capability. The XSCFU_B boards can be removed and replaced without the need to power down the server.

Figure showing XSCFU_B (Top) and XSCFU_C (Bottom) boards



Redundant Service Processors

The high-end servers use a redundant configuration of service processors (XSCFUs), thereby realizing a high-reliability with the system. The XSCFU that controls the server is called the *active* XSCFU. The other XSCFU acts as a backup and is called the *standby* XSCFU.

The active XSCFU and the standby XSCFU monitor each other, and if an error is detected, they determine when a failover or switching to active or standby should be performed.

M9000+ Servers

The M9000+ server, which is essentially two M9000 servers with additional components, uses two XSCFU_B units as before but also adds two XSCFU_C units, with the following characteristics:

- The XSCFU_C is the repeater unit of the XSCFU, and is installed in the extended chassis of the M9000+ server.
- The XSCFU_C connects to the XSCFU_B, installed in the base chassis, and enables XSCF to operate and administer the extended chassis.
- There are two XSCFU_C boards to offer redundant configuration.
- While the system is in operation, the XSCFU_C board can be replaced, without affecting the system.

Service Processor Comparison Summary

Feature	M4000 and M5000 Servers	M8000 and M9000 Servers	M9000+ Servers
Number of XSCFUs	One	Two	Four, including the XSCFU_C boards
Redundant?	No	Yes	Yes
Hot-swap capable?	No	Yes	Yes
Physical location	Rear	Front	Front
Component label	XSCFU (x1)	XSCFU_B (x2)	XSCFU_B (x2) XSCFU_C (x2)

Service Processor Networks

The service processor makes use of three networks to handle communications between components of the MX000 servers, as well as provide external access. The three networks are the:

- Domain to Service Processor Communications Protocol (DSCP)
- XSCF external administration network
- XSCF Internal SCF LAN (ISN) network (for redundant XSCFU)

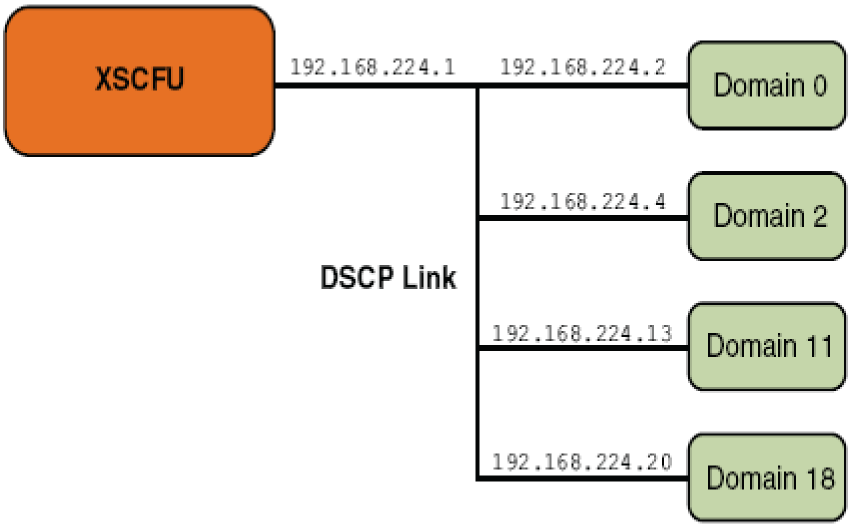
Note – The MX000 servers are shipped without any of the networks configured.

DSCP Network

The DSCP provides an internal and very secure PPP based communication link between the Solaris OS domains and the service processor, as seen in Figure 5-4. This is not a general use network, it is intended to be used by DR, the Fault Management Agent, and NTP.

The DSCP network is comprised of:

- One IP address dedicated to the DSCP network
- One IP address per domain dedicated to the DSCP network



Network Configuration Settings

The DSCP network is not enabled by default, instead it is enabled when the initial service processor configuration is completed, which includes setting up the DSCP network parameters.

When the DSCP network is configured, the administrator simply decides what the base IP address and netmask will be. The system then automatically assigns appropriate IP addresses, incrementing the base IP address by a count of +1.

The following example shows the network configuration based on entering a base IP address of 192.168.224.0 and a netmask of 255.0.0.0:

```
XSCF> showdscp
     DSCP Configuration:
     Network: 192.168.224.0
     Netmask: 255.0.0.0

     Location Address
     SP 192.168.224.1
     Domain #00 192.168.224.2
     Domain #01 192.168.224.3
     ...
```

Note – The default base address for DSCP from the EIS checklist is currently 192.168.224.0

Commands Used

The DSCP network is configured and managed using the following commands:

- `setdscp`
- `showdscp`

Caution – The DSCP network should only be configured when there are no domains running. If a change is made to the DSCP network while a domain is active, the domain must be rebooted before the service processor can communicate with it.

XSCF External and ISN Network

The XSCF ISN network provides internal communication between service processors in an MX000 server. In a high-end server, one service processor is designated as active, while the other service processor is designated as standby.

The XSCF ISN network allows the active service processor to exchange pertinent system management information with the standby service processor so that if a failure occurs, the standby service processor can take over as the new active service processor without any interruption of service.

The XSCF external network connects the service processors to the customer network for administrative access to the service processor, such as access to the CLI.

Network Interfaces

The XSCF network makes use of several interfaces to handle the communication between service processors, provide floating IP addresses in case of service processor failover, and provide for external communication.

XSCF	Interface	Description
XSCF0	XSCF#0-lan#0	External network port0
	XSCF#0-lan#1	External network port1
	XSCF#0-if	Inter SCF Lan (ISN)
XSCF1	XSCF#1-lan#0	External network port0
	XSCF#1-lan#1	External network port1
	XSCF#1-if	Inter SCF Lan (ISN)
	lan#0 lan#1	Takeover (floating) IP addresses

Required Network Parameters

The XSCF network parameters are the:

- Active service processor IP address (`XSCF#0-lan#0`)
- Standby service processor IP address (`XSCF#1-lan#0`)
- Gateway address
- Netmask
- MAC address
- Network route

Commands Used

The XSCF network is configured and managed using the following commands:

- `setnetwork`
- `setroute`
- `applynetwork`
- `shownetwork`

Configuring the Service Processor

This section describes the steps required for performing the initial configuration of the service processor. You must complete the following basic steps when you first configure the service processor:

- Gather required information
- Log in to the service processor
- Add a user account
- Set the service processor date and time
- Set the time zone
- Set the locale
- Set the server altitude
- Enable basic services
- Configure the DSCP network
- Configure the XSCF external admin network
- Configure the XSCF ISN network
- Configure network time protocol (NTP)
- Reset the XSCF

Gathering Required Information

Before you configure the software, you need to have the following available:

- An unused range of IP addresses for the internal DSCP network between the service processor and the domains
- Network configuration information for the service processor, including: IP addresses, netmask, DNS server, and default route
- The number of domains in the server
- Information for optional services that you are going to use, such as Lightweight Directory Access Protocol (LDAP) information for authentication.

Logging Into the Service Processor

The initial login to the service processor is performed using a serial connection from a terminal device and the `default` account name. This `default` account is unique in the following ways:

- It cannot be logged into using the standard UNIX user name and password authentication or SSH public key authentication.
- It can only be logged into using a procedure that requires physical access to the server.
- Its privileges are fixed as `useradm` and `platadm`, which allows you to configure the service processor, add users, or reset passwords.
- It cannot be deleted.
- It has no password, and no password can be set for it.

Note – The following procedure can also be used if the login password is lost.

Initial Configuration Steps

To perform an initial login, complete the following steps with the server powered off:

1. Connect the supplied serial cable from the XSCFU to a terminal device.
2. Establish a connection to the XSCFU.
3. Set the operator panel keyswitch to the *service* position.
4. Power on the server.

   Observe the boot messages that are displayed via the serial connection. When the XSCFU completes the boot process, a login prompt is displayed.
5. Log in to the service processor using the `default` login name from a terminal device connected to the service processor, there is no password for this account:

```
login: default
```

6. When prompted, toggle the Operator Panel MODE switch on the front of the server. The MODE switch has two positions: *Service* and *Locked*.

   a. If the switch is in the *Service* position, turn it to the *Locked* position, leave it there for five seconds, turn it back to *Service* and then press the `enter` key in your terminal session.

   b. If the switch is in the *Locked* position, turn it to the *Service* position, leave it there for five seconds, turn it back to *Locked* and press `enter` in your terminal session.

When the toggle procedure is complete, the service processor shell will be displayed in the terminal session:

XSCF>

Setting the Service Processor Time

The XSCF board is designed to stop keeping time when it is removed from the platform chassis. This saves the battery when a board is in storage. This does however cause some behavior that you should be aware of:

- When an XSCFU is physically reinserted/replaced, the XSCFU date will be reset to December 31, 2000.
- When a domain runs a `date` command to set the date, the *date offset* on the XSCF will be adjusted appropriately. In other words, when a domain reboots, it will preserve its time and not be affected by the XSCF boards date of December 31, 2000.
- When the `setdate` command is run on the XSCF under normal circumstances, the date offsets of the domains will be changed (the domains will preserve their dates). When the setdate command is run on the XSCF when the date is December 31 2000, then the date offsets of the domains *will not* be changed. Thus, as long as the initial `setdate` for the XSCF is completed everything should be fine on the domains.
- The `setdate` command on the XSCF will not work if any of the domains are powered up.
- When an XSCFU is inserted/replaced, the normal documented procedures are to run the `setdate` CLI before domains are powered up. This will preserve date sanity from the perspective of the domains.
- The `resetdateoffset` command resets all domain offsets back to zero. This command can only be run if all domains are powered down. After this command is run, all domains will boot with the current XSCF time.

Setting the Initial Date and Time

To set the date and time, complete the following steps:

1. Log in to the service processor using an account with `platadm` or `fieldeng` privileges.
2. Display the current date:

```
XSCF> showdate
```

Wed Feb 28 20:06:43 EST 2007

3. Set the date to the desired format and value:

```
XSCF> setdate -s 022808092007.00
```

Wed Feb 28 20:09:50 EST 2007

```
The XSCF will be reset. Continue? [y|n] :y
```

Broadcast message from root (pts/4) (Wed Feb 28 20:07:13 EST 2007):

The system is shutting down for reboot NOW!

...

Firmware Features and Functions

The service processor firmware is contained as a single software image, which is known as the XSCF Control Package (XCP).

The XCP package is provided as a compressed file. The file name will be representative of the server type that it should be used for:

`DCXP`*`xxyy`*`.tar.gz` XCP firmware file for the MX000 high-end servers

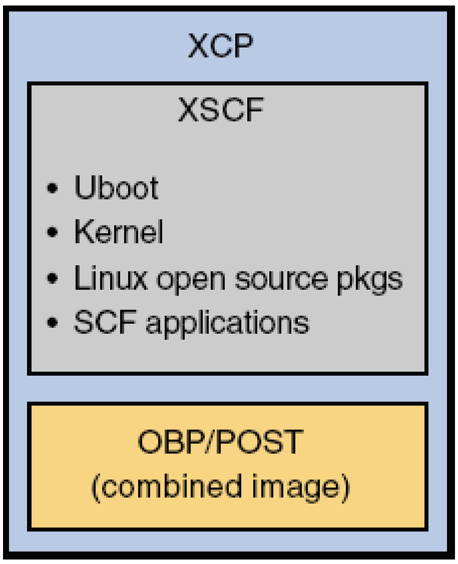
`FFXP`*`xxyy`*`.tar.gz` XCP firmware file for the MX000 mid-range servers

XSCF Control Package

The XCP is the collective software and firmware that is resident on the MX000 servers service processor. The main components of the XCP as seen in Figure 5-11 are:

- XSCF – The extended system controller facility
- OBP – The Open Boot Prom
- POST – The power on self-test

XCP Overview Diagram



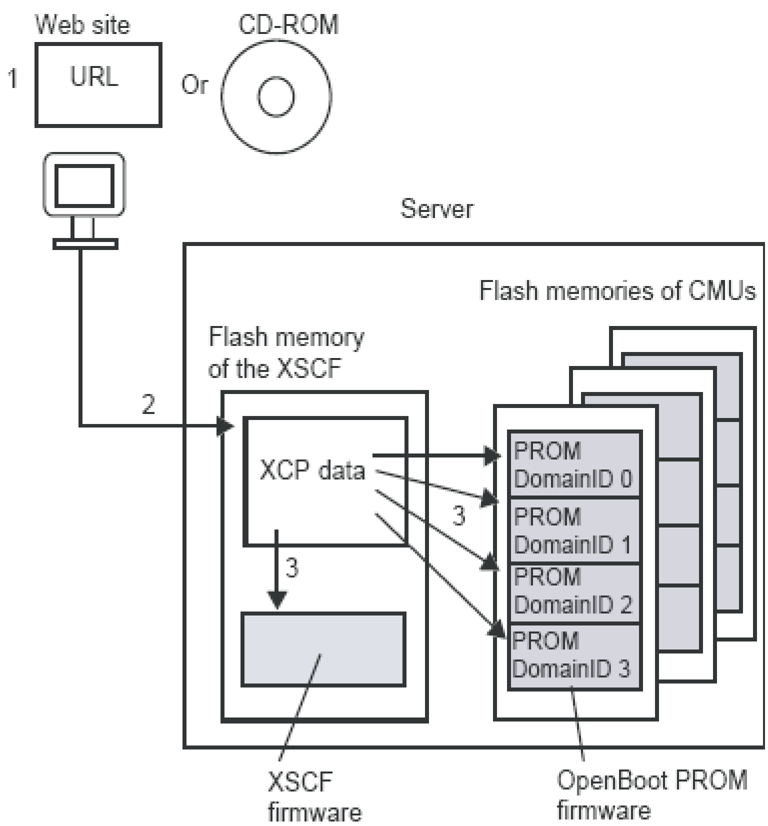
Firmware Update Overview

The firmware update procedure consists of three logical steps.

1. Import. This step consists of downloading the firmware from a CD-ROM or Browser User Interface (BUI).

2. Update. This step consists of copying the imported firmware to flash memory of the service processor(s).

3. Apply. This step consists of copying the updated firmware to the domains.



Firmware Update Features

The XSCF firmware update has the following features:

- The new firmware is intended to be updated without the need to stop running domains.
- To update the OpenBoot PROM firmware for a domain, the target domain must be rebooted so that the firmware can be applied.
- When a component is replaced, the firmware is automatically updated. However, when a component is cold replaced (input power off), the firmware is not updated automatically.
- In a system consisting of multiple domains, firmware in one domain can be updated without affecting the remaining domains.
- If an error occurs during the update operation, the firmware generation management mechanism (which retains spare firmware) can prevent firmware data destruction.

Redundant Service Processors

In a system with redundant service processors, the firmware upgrade is performed first on the standby service processor and then on the active service processor.

The service processor resets itself and the service processor networks. The network will be unavailable during this procedure, therefore the user will need to login again.

Enabling Escalation and Service Modes

Most of the tasks required to monitor and configure the MX000 servers are performed in normal user mode on the service processor. There are, however, two other modes of operation that provide advanced functionality to the user. These additional modes are:

- Service mode
- Escalation mode

Mode Usage Overview

Four steps are required to enter either service or escalation mode:

1. Obtain a valid password from an authorized service provider to execute the appropriate enable command. You will be required to supply the serial number of the server as well as the XSCF version number.

2. Enable the requested mode of operation using the appropriate enable command, `enableservice` or `enableescalation`.

3. Provide the password obtained in Step 1 when prompted.

4. Use the mode password that is generated by the enable command to enter into the appropriate mode, `service` or `escalation`. The following section provides information regarding the specific commands that are used to enable both the escalation and service modes for the MX000 servers. These commands are:

- `enableservice`
- `service`
- `enableescalation`
- `escalation`

Note – The service mode is intended to be used only by authorized personnel. The escalation mode will be only be used during an escalation and with the guidance of engineering personnel.

The `enableservice` Command

The `enableservice` command enables the current user's account for access to service mode. The user must have `mode` privileges and provide a valid password. This password is obtained from an authorized service provider. This password is valid for 48 hours and is tied to the chassis ID of the system that the password is used on, the command mode, and the XSCF software version.

After a mode password is obtained and the **`enableservice`** command is executed successfully, the XSCF generates a short random mode password, which is displayed to the user. This password is also only valid for 48 hours. You must provide this mode password when enteringservice mode via the **`service`** command.

A new password is generated each time an account is enabled, invalidating any previous passwords. Once you enter service mode, you will stay in that mode until you explicitly `exit` that mode or enter another mode.

The syntax for this command is:

enableservice

enableservice -h

Options and Parameters

The options and parameters for this command are:

`-h` Displays command usage.

Sample Command Output

The following example enables escalation mode:

```
XSCF> enableservice
Service Password:
**** **** **** **** *** ***
**** **** **** *** **** ***
**** *** **** **** **** ***
*** **** *** **** *** ****
*** **** **** **** *** *
Mode password is: WET RUDE LILY
XSCF>
```

The `service` Command

The `service` command switches the user from their current session mode to service mode. Service mode provides the user with all capabilities available in normal mode, plus an extended set of commands. The extended set of commands are mainly for nondestructive diagnosis of the service processor. A user in service mode can view file and directory contents and has direct write access to a restricted set of directories and files.

Password Generation

A new password is generated each time an account is enabled, invalidating any previous passwords. When you enter service mode, you stay in that mode until you explicitly exit that mode or enter another mode. Password input is not displayed but is represented by asterisks.
When a session is in service mode, normal mode commands continue to be access controlled and audited.

The syntax for this command is:

```
service
service -h
```

Sample Command Output

The following example enables escalation mode:

```
XSCF> service
Password: *** **** ***
service> showmodes
Currently in service mode.
Enabled for service mode until 01/23/06 11:20 am.
service> exit
XSCF>
```

The `enableescalation` Command

The `enableescalation` command enables the current user's account for access to escalation mode. The user must have mode privileges and provide a valid password. This password is obtained from an authorized service provider. This password is valid for 48 hours and is tied to the chassis ID of the system the password is used on. When an account is enabled for access to escalation mode, XSCF generates a short random mode password, which is displayed to the user. This password is also valid for 48 hours. You must provide this password when actually entering escalation mode.

Note – Enabling an account for escalation mode also enables it for service mode.

Password Generation

A new mode password is generated each time an account is enabled, invalidating any previous passwords. Once you enter escalation mode, you will stay in that mode until you explicitly exit that mode or enter another mode.

The syntax for this command is:

```
enableescalation
enableescalation -h
```

Sample Command Output

The following example enables escalation mode:

```
XSCF> enableescalation
Escalation Password:
**** **** **** **** *** ***
**** **** **** *** **** ***
**** *** **** **** **** ***
*** **** *** **** *** ****
*** **** **** **** *** *
Mode password is: LOVE CAT NAPS
XSCF>
```

The `escalation` Command

The `escalation` command switches the current user mode to escalation mode. Escalation mode provides the user with access to everything in the system. All commands available on the service processor can be run in this mode and full access to all files and directories is provided.

Password Generation

A password is required and prompted for. Password input is not displayed but is represented by asterisks. When a session is in escalation mode, normal mode commands continue to be access controlled and audited.

The syntax for this command is:

```
escalation
escalation -h
```

Sample Command Output

The following example enables escalation mode:

```
XSCF> escalation
Password: **** *** ****
escalation> showmodes
Currently in escalation mode.
Enabled for escalation mode until 01/23/06 11:15 am.
escalation> exit
XSCF>
```

Operation Of The Server

Operation of the Server

This chapter mainly describes operation of the server hardware.

Display Server Hardware Environment

This section describes methods for checking the configuration and status of the server hardware during system configuration or operation.

To display the configuration and status of a server, use the XSCF Shell.

Commands Used to Display Information

Execute the following commands individually, as appropriate.

- `showhardconf`
- `version`
- `showdate`
- `showenvironment`
- `showstatus`
- `cfgdevice`

Displaying System Information

- Command operation

1. Use the `showhardconf` (8) command to check the mode switch status.

```
XSCF> showhardconf
Sun SPARC Enterprise xxxx;
     + Serial:PP20605005; Operator_Panel_Switch:Locked;
     + Power_Supply_System:Single; SCF-ID:XSCF#0;
     + System_Power:On; System_Phase:Cabinet Power On;
     Domain#0 Domain_Status:Powered Off;

     MBU_B Status:Normal; Ver:0101h; Serial:7867000282  ;
:
```

2. Use the `showdate` (8) command to display the system time.

```
XSCF> showdate
Thu Jul 6 14:48:01 UTC 2006
```

3. Use the `version` (8) command to display the XCP comprehensive firmware version, XSCF version, and OpenBoot PROM version.

```
XSCF> version -c xcp -v
XSCF#0 (Active)
XCP0 (Current)    : 1020
OpenBoot PROM     : 01.01.0001
XSCF              : 01.01.0001
XCP1 (Reserve)    : 1020
OpenBoot PROM     : 01.01.0001
XSCF              : 01.01.0001
OpenBoot PROM  BACKUP
#0: 01.01.0001
#1: 01.02.0001
XSCF#1 (Standby)
XCP0 (Current)    : 1020
OpenBoot PROM     : 01.01.0001
XSCF              : 01.01.0001
XCP1 (Reserve)    : 1020
```

```
OpenBoot PROM     : 01.01.0001
XSCF              : 01.01.0001
OpenBoot PROM BACKUP
#0: 01.01.0001
#1: 01.02.0001
```

(This screenshot is provided as an example.)

4. Use the `showstatus` (8) command to display information on degraded components in the system.

```
XSCF> showstatus
*   BP_A Status:Degraded;
*       DDC_A#0 Status:Faulted;
*   PSU#0 Status:Faulted;
```

(This screenshot is provided as an example.)

5. Use the `showenvironment` (8) command to display the ambient temperature, humidity, and voltage of the system.

```
XSCF> showenvironment
Temperature:30.70C
Humidity:90.00%
XSCF> showenvironment temp
Temperature:30.70C
CMU#0:43.00C
    CPUM#0-CHIP#0:65.00C
    CPUM#1-CHIP#0:61.20C
    CPUM#2-CHIP#0:64.80C
    CPUM#3-CHIP#0:63.60C
CMU#1:45.50C
:
XSCF>  showenvironment volt
MBU_B
    1.0V Power Supply Group:1.000V
    1.8V Power Supply Group:1.910V
    CPUM#0-CHIP#0
        1.0V Power Supply Group:1.050V
:
```

(This screenshot is provided as an example.)

Note - The humidity information is only displayed in high-end systems.

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Display Server Configuration/Status Information

- Command operation

Use the `showhardconf` (8) command to check the status of a device.

```
XSCF> showhardconf
Sun SPARC Enterprise xxxx;
     + Serial:PP20605005; Operator_Panel_Switch:Locked;
     + Power_Supply_System:Single; SCF-ID:XSCF#0;
     + System_Power:On; System_Phase:Cabinet Power On;
     Domain#0 Domain_Status:Powered Off;

     MBU_B Status:Normal; Ver:0101h; Serial:7867000282  ;
:
```

The status information of each device is as below.

- CPU/Memory board unit / Motherboard unit information

Unit number, status, version, serial number, FRU number, and memory capacity

- CPU module information

Unit number, status, version, serial number, FRU number, CPU operating frequency, CPU type

- Memory information

Unit number, status, version, serial number, FRU number, and information on each memory slot. In the high-end systems, there is information on each memory slot.

The displayed information on each memory slot includes the unit number, status, code, type and memory capacity.

- DDC information

Unit number, status

- I/O unit information

Unit number, status, version, serial number, FRU number, and information on each PCI and DDC.

The displayed information on each PCI includes the unit number, name property, and card type.

The displayed information on each DDC includes the unit number and status.

- External I/O Expansion Unit (IOBOX) information

Unit number, serial number and information on each I/O boat and PSU in an I/O expansion unit

(see Note).

The displayed information on each I/O boat includes the unit number, serial number, and link information.

The displayed link information includes the version, serial number, and type.

The displayed information on each PSU includes the unit number and serial number.

- XSCF Unit information

Unit number, status, version, serial number, and FRU number

- XB unit information

Unit number, status,version, serial number, and FRU number

- BP information

Unit number, status, version, serial number, FRU number and each DDC information

The displayed information on each DDC includes the unit number version, serial number, and FRU number.

- Clock unit information

Unit number, status, version, serial number, and FRU number

- Operator panel information

Unit number, status, version, serial number and FRU number

- PSU information

Unit number, status, serial number, FRU number, power status, and voltage

- FANBP information

Unit number, status, version, serial number, and FRU number

- FAN unit information.

Unit number, status, serial number

Note - The configuration information might change based on model configuration in the high-end systems and midrange systems.

Note - The External I/O Expansion Unit may be referred to as IOBOX in example program output and the text in this manual.

Air-Conditioning Wait Time Administration

The air-conditioning wait time is intended to prevent the server from performing power-on processing until the room temperature environment is prepared by air-conditioning facilities. Once the air-conditioning wait time is set, the server will start power-on processing after its power is turned on and the set air-conditioning time elapses.

- Command operation

1. Use the `showpowerupdelay` (8) command to display the air-conditioning wait time (wait time).

```
XSCF> showpowerupdelay
warmup time : 10 minute(s)
wait time   : 20 minute(s)
```

2. Use the `setpowerupdelay` (8) command to set the air-conditioning wait time. Set the air-conditioning wait time from 0 to 255 (min). The default is "0 min."

```
<Example>  The air-conditioning wait time is set to 15 min.
XSCF> setpowerupdelay -c wait -s 15
```

3. Confirm whether the setting time is valid when turning on the server power supply the next time, by checking the time from when you perform the power on till when the PSU is actually turned on.

Warm-Up Time Administration

The warm-up time is intended to prevent the PSU and the FAN from running until the power supply environments of peripheral units are prepared after the server starts the power-on processing. Once the warm-up time is set, the OpenBoot PROM will start after the server power supply is turned on, the power-on processing starts, and the set warm-up time elapses.

Note - The FAN in a midrange system is driven at low speed as the server starts the power-on process.

- Command operation

1. Use the `showpowerupdelay` (8) command to display the warm-up time (`warmup time`).

```
XSCF> showpowerupdelay
warmup time : 10 minute(s)
wait time   : 20 minute(s)
```

2. Use the `setpowerupdelay` (8) command to set the warm-up time. Set the warm-up time from 0 to 255 (min). The default is "0 min."

```
<Example>  The warm-up time is set to 5 min.
XSCF> setpowerupdelay -c warmup -s 5
```

3. When turning on the server power supply the next time, please confirm that it takes more time than usually by checking the amount of time it takes from the power on until the time when the first Power On Self Test (POST) start message is displayed.

Note - Once the air-conditioning time is set, the warm-up time will be valid after the power is turned on and the air-conditioning time elapses.

Caution - IMPORTANT - When the power is turned on from the operator panel, the air-conditioning time and warm-up time that you set are ignored. If you have set these times and wish to observe them at startup, perform the `poweron` (8) command.

Shutdown Wait Time Administration

The shutdown wait time administration is a setting to delay the shutdown start by specifying the shutdown start time when a power failure has occurred in the system with the UPS.

- Command operation

1. Use the `showshutdowndelay` (8) command to display the shutdown wait time.

```
XSCF> showshutdowndelay
UPS shutdown wait time : 500 second(s)
```

2. Use the `setshutdowndelay` (8) command to set the shutdown wait time. Set the shutdown wait time from 0 to 9999 (sec). The default is "10 sec."

```
<Example>  The shutdown wait time is set to 600 sec.
XSCF> setshutdowndelay -s 600
```

Identifying the Location of the System

When more than one same type of system is installed in the same area, it may be difficult to locate the target system. You can easily find target machine, even when it does not have any faulty components, by using the XSCF Shell `showlocator` (8) command and looking for the blinking the CHECK LED on the operator panel.

- Command operation

1. Use the `showlocator` (8) command to display the current status of the CHECK LED.

```
XSCF> showlocator
Locator LED status: Off
```

2. Use the `showlocator` (8) command to blink or reset the CHECK LED.

```
<Example 1> Blink the CHECK LED.
XSCF> setlocator blink

<Example 2> Reset the CHECK LED.
XSCF> setlocator reset
```

3. Use the `showlocator` (8) command to display the state of the CHECK LED.

```
XSCF> showlocator
Locator LED status: Blinking
```

Managing Fault Degradation

Displaying the Degraded Component

The status of a faulty or degraded component, or a part of such component, can be displayed by using the following methods:

- Command operation

Use the `showstatus` (8) command to display the unit status. An asterisk (*) is attached to a unit in abnormal status.

```
<Example 1>  The CPU and memory on the motherboard unit (MBU) are degraded due to failure
XSCF> showstatus
    MBU_B Status:Normal;
*       MEMB#1 Status:Deconfigured;
*           MEM#3B Status:Deconfigured;

<Example 2>  The CPU is degraded due to the effect of the crossbar unit (XBU) being degra
XSCF> showstatus
    MBU_B Status:Normal;
*       CPUM#1-CHIP#1 Status:Deconfigured;
*   XBU_B#0 Status:Degraded;

<Example 3>  No degraded component is found.
XSCF> showstatus
No failures found in System Initialization.
```

The meaning of each component status is as follows:

Faulted	The component is faulty and not operating.
Degraded	The component is operating. However, either an error has been detected or the component is faulty. As a result, the component might be operating with reduced functionality or performance.
Deconfigured	As a result of another component's faulted or degraded status, the component is not operating. (The component itself is not faulted or degraded.)
Maintenance	The corresponding component is under maintenance. A `deletefru` (8),

`replacefru` (8), and `addfru` (8) operation is currently underway.

Switching the XSCF Unit

In some cases, such as when an error occurs in the LAN route of the XSCF Unit on the active side in a system in which the XSCF Unit is redundantly configured, it may be necessary to switch the active side over to the standby side.

The procedure for switching the XSCF Unit status from standby to active is as follows:

- Command operation

1. Log in the XSCF Unit on the standby side.
2. Use the `switchscf` (8) command to switch the XSCF Unit from standby status to active status.

Note - If possible, confirm that the ACTIVE LED states changes on the front panels of both XSCF Units. Execute the `switchscf` (8) command only on one side (active side or standby side) of the XSCF Units to automatically switch active/standby status of the other XSCF Unit.

Processing Continued at Failover

In case the failover was generated while the following processes are executing, the process will be continued:

- Domain power-on process
- Domain power-off process
- DR function

Caution - IMPORTANT - In case an XSCF failover is generated, the setting may not have been completed. Log in to the active side XSCF again to confirm whether or not the setting was applied. If the setting was not applied, perform the setting operation again.

Displaying State of an External I/O Expansion Unit and Administration ioxadm

This section describes the management overview of an External I/O expansion unit connected to the server, components in the External I/O Expansion Unit (I/O boards, link cards, and power supply units<PSUs>), and downlink cards mounted in PCI slots in the server.

Note - For the hardware configuration of an External I/O Expansion Unit, see the *External I/O Expansion Unit Installation and Service Manual* or each model's *Service Manual*. For details and examples of use of commands, see the *XSCF Reference Manual* and the `ioxadm` (8) man page.

External I/O Expansion Unit Administration Terms

Term	Description
Host path	Device path. A device name and device number are used to represent the layer location of a component in the component layer structure. (Example: IOU#1-PCIE#4)
Downlink card path	A downlink card that is mounted in a PCI slot in an I/O unit of the server and connected to an External I/O Expansion Unit. An External I/O Expansion Unit is connected to one or two downlink cards. A downlink card path represents the layer location indicating which downlink card is connected to the External I/O Expansion Unit in the layer structure. (Example: IOU#1-PCIE#2)

External I/O Expansion Unit Administration

Item	Description	Shell Command	Remarks
Display list	Displays a list of External I/O Expansion Units and downlink cards. The following is displayed: • Set External I/O Expansion Unit numbers and downlink card paths • Exernal I/O Expansion Units, I/O boards, link cards (Note 1), downlink cards, PSU types, firmware versions, serial numbers, part numbers, and states	`ioxadm`	External I/O Expansion Unit numbers are set in two ways: specifying last four digits of serial numbers such as `iox@nnnn`, and specifying instance numbers such as ioxn.
Display environment information	Displays the status of the environment of the specified External I/O Expansion Unit or downlink card as sensor measurement values. The following is displayed: • Current (A) • Voltage (V) • FAN speed (RPM) • Temperature (C) • LED state	`ioxadm`	Also, the preciseness is displayed together with the sensor measurement values.
Display/set locator LED (Note 2)	Displays and sets the locator LED state for individual components in the specified External I/O Expansion Unit. Each locator LED is in one of the	`ioxadm`	Only one locator LED can be enabled or disabled at a time in an External I/O Expansion Unit.

Item	Description	Shell Command	Remarks
	following states: • Blinking • Lit • Off Any of the following locator LED states can be set: • Enabled (on) • Disabled (off)		
Power on/off	Turns on or off power to the specified I/O board or PSU. Note: To forcibly disconnect an IO board belonging to a domain, use the `-f` option.	`ioxadm`	Even after the power switch is set to off, LEDs and FANs continue operating as long as they are supplied with power.

Note - (1) Also called uplink cards. They are mounted on I/O boards.

Note - (2) A locator LED that indicates a location. The names of locator LEDs depend on the corresponding components. For the External I/O Expansion Unit and LED types and the descriptions of components contained in an External I/O Expansion Unit, see the External I/O Expansion Unit Installation and Service Manual.

Displaying a List of External I/O Expansion Units, I/O Boards, Link Cards, and PSUs or Displaying Their Environment Information

- Command operation

Use the `ioxadm` (8) command to display a list of External I/O Expansion Units and downlink card paths and to display information for each component.

```
<Example 1>  Display a list of External I/O Expansion Units and downlink cards
XSCF> ioxadm list
IOX             Link 0          Link 1
IOX@5309        IOU#2-PCI#2     IOU#3-PCI#1
IOX@A3B5        -               IOU#1-PCI#1
-               -               IOU#2-PCI#1

<Example 2>  Display a list of External I/O Expansion Units, I/O ports, link
cards, and PSUs
XSCF> ioxadm -v list IOU#1-PCI#1
Location       Type        FW Ver   Serial Num  Part Num    State
IOX@A3B5       IOX         1.4      CP0001      5016937-01  On
IOX@A3B5/PS0   A195        -        PS0001      3001701-02  On
:
<Example 3>  Display environment information based on sensor measurements
XSCF> ioxadm env -te IOX@A3B5
Location       Sensor         Value         Res  Units
IOX@A3B5/PS0   T_AMBIENT     28.000       1.000      C
IOX@A3B5/PS0   V_ISHARE       0.632       0.040      V
IOX@A3B5/PS0   I_DC           2.316       0.289      A
IOX@A3B5/PS0   S_FAN_SET   4500.000     300.000    RPM
:
```

Displaying and Setting the Locator LED State of Each Specified Component in an External I/O Expansion Unit

- Command operation

Use the `ioxadm` (8) command to display or set the locator LED state of the specified component.

```
<Example 1>  Display the locator LED states of an External I/O Expansion Unit
and components.
XSCF> ioxadm locator iox@12B4
Location         Sensor  Value   Res     Units
IOX@12B4         LOCATE  Fast    -       LED
IOX@12B4/PS0     SERVICE Fast    -       LED

<Example 2>  Set the locator LED state of PSU0 to on.
XSCF> ioxadm locator on iox@12B4/ps0
Location         Sensor  Value   Res     Units
IOX@12B4         LOCATE  Fast    -       LED
IOX@12B4/PS0     SERVICE On      -       LED
```

Turning On or Off Power to an I/O Board or PSU

- Command operation

Use the `ioxadm` (8) command to display, turn on or off power to the specified component.

```
<Example 1>  Display the PSU states of an External I/O Expansion Unit and
components.
XSCF> ioxadm -v list IOX@12B4
Location               Type       FW Ver     Serial Num    Part Num     State
IOX@12B4                IOX       1.0        XCX033        5016937-03   On
IOX@12B4/PS0           A195       -          T01056        3001701-03   On
IOX@12B4/PS1           A195       -          T01074        3001701-03   On
IOX@12B4/IOB0          PCIX       -          XX00A3        5016938-04   On
IOX@12B4/IOB0/LINK     OP         1.3        XF00X8        5017040-03   On

<Example 2>  Turn off power to I/O board 0.
XSCF> ioxadm poweroff iox@12B4/iob0

<Example 3>  Turn on power to I/O board 0 again.
XSCF> ioxadm poweron iox@12B4/iob0
```

Exploring Domains

Exploring Domains

Exploring Domains

The MX000 servers can be divided into multiple servers called domains. Domains are based on assigned logical system boards (LSBs). Each domain runs its own Solaris OS instance and handles its own workload. Properly configured domains do not depend on each other and are isolated so that a panic in one domain does not affect the other domains running in the server.

Before configuring the server, the administrator must determine the number of domains needed and how to configure them.

Static and Dynamic Domains

There are two implementations of domain configuration: static and dynamic. Static domain configuration adds and removes boards in an inactive domain. Dynamic domain configuration adds or removes boards in an active domain with the Solaris OS running in the form of a DR operation.

Note – This module only describes configuring and managing static domains.

Domain Configuration

To configure a domain, you must assign system resources, or LSBs, to each domain that you intend to use. This logical assignment of system resources to each domain is performed by setting the configuration parameters on the service processor. When the configuration has been set and the domain is initialized, this logical grouping isolates a domain's resources on the motherboard. This is referred to as a dynamic system domain (DSD).

The service processor supports commands that allow you to logically group LSBs into domains. You can create and delete domains without interrupting the operation of other domains. You can use domains for many purposes, such as testing a new OS version or setting up a development and testing environment in a domain. If you use a domain to do this, and problems occur, other domains running in your system are not affected. You can also configure several domains to support different departments, with one domain per department. You can also temporarily reconfigure the system into one domain to run a large job over the weekend.

Domain Configuration on the Mid-Range Servers

The M4000 server supports one or two domains and the M5000 server supports as many as four domains. The domains are referenced as Domain ID (DID) 0–3.

Domain Configuration on the High-End Servers

The M8000 server supports as many as 16 domains and the M9000 and M9000+ servers support as many as 24 domains. The domains are referenced as Domain ID (DID) 0–23.

Domain Configuration Unit (DCU)

A DCU is a unit of hardware that can be assigned to a single domain. DCUs are the hardware components from which a domain can be constructed.

The DCUs in the MX000 servers consist of LSBs. Before configuring the LSBs, you should be familiar with the following terms:

Physical System Board (PSB) – Consists of CPU, memory, and I/O. The I/ O is optional on the high-end servers.

eXtended System Board (XSB) – Allows you to configure your PSB as a uni-board (00-0) with all of the components assigned to it or a quad-board with four XSBs (00-0, 00-1, 00-2, 00-3) and the components being divided.

Logical System Board (LSB) – To create domains, you must first assign the XSBs to LSBs. There are 16 LSBs available to each domain.

The M4000 Server

The M4000 server, contains one PSB, which consists of:

One I/ O unit (IOU 0) containing:

One PCI-X slot

Four PCI-E slots

Built-in I/ O (two disks and two GbE ports, DVD and optional DAT)

Two CPU modules (CPUM0 and CPUM 1) containing two CPUs each

Four memory boards (MEMB0 through MEMB3) containing eight DIMMs each

Having this PSB configured as a uni-board, XSB 00-0, allows you to create one domain on this server with all of the components assigned to it. Part of the domain configuration, which is described in this module, is to assign the XSB to a LSB before actually assigning it to a domain.

Configuring the physical system board as a quad-board results in the following XSBs:

XSB 00-0 containing:

One CPU (CPU0 on CPUM0)

One MEMB containing eight DIMMs (MEMB0)

The PCI-X slot 0 on IOU 0

Two PCI-E slots (1 and 2) on IOU 0

Built-in I/ O (two disks and two GbE ports, DVD and optional DAT) on IOU 0

XSB 00-1 containing:

One CPU (CPU1 on CPUM0)

One MEMB containing eight DIMMs (MEMB1)

Two PCI-E slots (3 and 4) on IOU 0

XSB 00-2 containing:

One CPU (CPU0 on CPUM1)

One MEMB containing eight DIMMs (MEMB2)

XSB 00-3 containing:

One CPU (CPU1 on CPUM1)

One MEMB containing eight DIMMs (MEMB3)

Having the server in this configuration allows you to create two domains. Each domain must have I/ O and I/ O is only assigned to XSB 00-0 and XSB 00-1.

The M5000 Server

The M5000 server contains the equivalent components of two M4000 servers. It contains two PSBs, with a total of:

- Two I/ O units, each containing:
  - One PCI-X slot
  - Four PCI-E slots
  - Built-in I/ O (two disks and two GbE ports)
- Four CPU modules (CPUM) containing two CPUs each
- Eight memory boards (MEMB) containing eight DIMMs each

Having these PSBs configured as uni-boards, XSB 00-0 and XSB 01-0, allows you to create two domains on this server with all of the components on XSB 00-0 going to one domain and all of the components on XSB 01-0 going to a second domain.

Configuring each of the PSBs as a quad-board results in the following XSBs:

- XSB 00-0 containing:
  - One CPU (CPU0 on CPUM0)
  - One MEMB containing eight DIMMs (MEMB0)
  - The PCI-X slot 0 on IOU 0
  - Two PCI-E slots (1 and 2) on IOU 0
  - Built-in I/ O (two disks and two GbE ports, DVD and optional DAT) on IOU 0
- XSB 00-1 containing:
  - One CPU (CPU1 on CPUM0)
  - One MEMB containing eight DIMMs (MEMB1)
  - Two PCI-E slots (3 and 4) on IOU 0
- XSB 00-2 containing:
  - One CPU (CPU0 on CPUM1)
  - One MEMB containing eight DIMMs (MEMB 2)
- XSB 00-3 containing:
  - One CPU (CPU1 on CPUM1)
  - One MEMB containing eight DIMMs (MEMB 3)

XSB 01-0 containing:

- One CPU (CPU0 on CPUM2)
- One MEMB containing eight DIMMs (MEMB4)
- The PCI-X slot 0 on IOU 1
- Two PCI-E slots (1 and 2) on IOU 1
- Built-in I/ O (two disks and two GbE ports) on IOU 1

XSB 01-1 containing:

- One CPU (CPU1 on CPUM2)
- One MEMB containing eight DIMMs (MEMB5)
- Two PCI-E slots (3 and 4) on IOU 1

XSB 01-2 containing:

- One CPU (CPU0 on CPUM3)
- One MEMB containing eight DIMMs (MEMB 6)

XSB 01-3 containing:

- One CPU (CPU1 on CPUM3)
- One MEMB containing eight DIMMs (MEMB 7)

Having the server in this configuration allows you to create as many as four domains. Each domain must have I/ O and I/ O is only assigned to XX-0 and XX-1 XSBs.

The M8000 Server

The M8000 server, contains four PSBs, with a total of:

- Four I/ O units (IOUs), each containing:
  - Eight PCI-E slots
  - Built-in I/ O (four disks)
- Four CPU Memory Units (CMUs), each containing:
  - Four CPUs
  - 32 DIMMs

Having these PSBs configured as uni-boards, XSB 00-0, XSB 01-0, XSB 02-0, and XSB 03-0, allows you to create four domains on this server with all of the components on XSB 00-0 going to one domain, all of the components on XSB 01-0 going to a second domain, and so forth.

Configuring a PSB as a quad-board results in the following XSBs:

- XSB 00-0 containing:
  - One CPU (CPU0 on CMU0)
  - The CPUs associated memory, consisting of eight DIMMs
  - Two PCI-E slots (0 and 1) on IOU 0
  - Built-in I/ O (two disks, HDD#0 and HDD#1) on IOU 0
- XSB 00-1 containing:
  - One CPU (CPU1 on CMU0)
  - The CPUs associated memory, consisting of eight DIMMs
  - Two PCI-E slots (2 and 3) on IOU 0
- XSB 00-2 containing:
  - One CPU (CPU2 on CMU0)
  - The CPUs associated memory, consisting of eight DIMMs
  - Two PCI-E slots (4 and 5) on IOU 0
  - Built-in I/ O (two disks, HDD#2 and HDD#3) on IOU 0
- XSB 00-3 containing:
  - One CPU (CPU3 on CMU0)
  - The CPUs associated memory, consisting of eight DIMMs
  - Two PCI-E slots (6 and 7) on IOU 0

The same pattern holds true for the remaining PSBs. Having the server in this configuration allows you to create as many as sixteen domains because each quad-XSB contains I/ O.

The M9000 and M9000+ Servers

The M9000 server, contains eight PSBs, with a total of:

- Eight I/ O units (IOUs), each containing:
  - Eight PCI-E slots
  - Built-in I/ O (four disks)
- Eight CPU Memory Units (CMUs), each containing:
  - Four CPUs
  - 32 DIMMs

Having these PSBs configured as uni-boards, XSB 00-0, XSB 01-0,
XSB 02-0, XSB 03-0, XSB 04-0, XBS 05-0, XSB 06-0, and XSB 07-0, allows you to create eight domains on this server with all of the components on XSB 00-0 going to one domain, all of the components on XSB 01-0 going to a second domain, and so forth.

The M9000+ server, contains sixteen PSBs, with a total of:

- Sixteen I/ O units (IOUs), each containing:
  - Eight PCI-E slots
  - Built-in I/ O (four disks)
- Sixteen CPU Memory Units (CMUs), each containing:
  - Four CPUs
  - 32 DIMMs

Having these PSBs configured as uni-boards, XSB 00-0 through XSB 15-0, allows you to create sixteen domains on this server with all of the components on XSB 00-0 going to one domain, all of the components on XSB 01-0 going to a second domain, and so forth.

For both the M9000 and M9000+ servers, configuring a PSB as a quad-board results in the following XSBs:

- XSB 00-0 containing:
  - One CPU (CPU0 on CMU0)
  - The CPUs associated memory, consisting of eight DIMMs
  - Two PCI-E slots (0 and 1) on IOU 0
  - Built-in I/O (two disks, HDD#0 and HDD#1) on IOU 0
- XSB 00-1 containing:

- One CPU (CPU1 on CMU0)
- The CPUs associated memory, consisting of eight DIMMs
- Two PCI-E slots (2 and 3) on IOU 0

XSB 00-2 containing:

- One CPU (CPU2 on CMU0)
- The CPUs associated memory, consisting of eight DIMMs
- Two PCI-E slots (4 and 5) on IOU 0
- Built-in I/O (two disks, HDD#2 and HDD#3) on IOU 0

XSB 00-3 containing:

- One CPU (CPU3 on CMU0)
- The CPUs associated memory, consisting of eight DIMMs
- Two PCI-E slots (6 and 7) on IOU 0

The same pattern holds true for the remaining PSBs. Having the server in this configuration allows you to create as many as 24 domains as each quad-XSB contains I/ O. The system does not allow you to create 32 domains because the upper eight domain IDs (DIDs) are reserved by the system for actions such as POST and DR operations.

Domain Configuration Requirements

You can create a domain out of any group of LSBs if the following conditions are met:

- The domain must contain at least one LSB with I/O that is not in use by another domain.
- The domain must have at least one network interface.
- The domain must have sufficient memory to support the OS and applications.
- At least one boot disk must be connected to the domain. If a domain does not have its own disk, at least one network interface must exist so that you can boot the domain from the network.

Note – The domain should contain enough physical resources to meet the requirements of the planned work load. Prior to constructing the domain, a *resource needs assessment* should be performed to ensure that the assigned resources meet these requirements.

Configuring Static Domains

A domain can be configured by the platform administrator or by the assigned domain administrator. If a system resource is already in use (active) by another domain, the service processor software does not let you manage that resource until it is released by that domain.

There are eight XSCF commands available for managing boards in a domain and setting domain boot parameters:

The setupfru command

The setdcl command

The addboard command

The deleteboard command

The moveboard command

The setdomainmode command

The setdomparam command

Note – The addboard, deleteboard, and moveboard commands work on both static and dynamic domains. You must know the state of the domain and DCU before executing these commands. If these commands are run on a dynamic domain, they may invoke a DR operation which is not supported at RR. Use the showboards command to get the DCU status before proceeding.

The `setupfru` Command

Use the setupfru command to set up hardware settings for a specified PSB. To reconfigure a PSB, it must be disconnected from the domain configuration and placed under the system board pool. You must have platform administrator or field engineer privileges to execute this command.

The syntax of the `setupfru` command is:

```
setupfru [-m {y I n}] [-x {1 I 4}] device location
```

Options and Parameters

The options and parameters for this command are:

- `-m [y I n]` – Specifies whether to use the memory mounted on the XSB in mirror mode
- `-x [1 I 4]` – Specifies whether to configure the PSB as a Uni-XSB or Quad-XSB
- `device` – Can only be specified as sb (for system board)
- `location` – Specifies an integer from 0-15

In the following example, sb 0 is configured into a quad-XSB.

```
XSCF> setupfru -x 4 sb 0
Operation was
completed.
```

The `showfru` Command

The `showfru` command displays the hardware settings for a specified device.

```
XSCF> showfru -a sb 0
Device  Location    XSB Mode       Memory Mirror Mode
sb      00          Quad           No
```

The `setdcl` Command

Use the setdcl command to set a domain component list (DCL). A DCL is hardware resource information that can be set for a domain or the LSBs that are components of a domain.

A LSB is the board unit that is recognized by an OS in a domain. As many as 16 boards can be registered in each domain. They are represented as LSB0 to LSB15.

An extended system board (XSB) is a board that can be used in the system and is one section of a partitioned PSB. An XSB is represented by *xx-y,* a combination of a PSB number (*xx)* and the number of one partition of the partitioned PSB (*y*). The value of *xx* is an integer ranging from 00 to 15 and *y* is an integer ranging from 0 to 3.

The setdcl command associates an XSB with an LSB that can be recognized by an OS in a domain. Its settings enable the OS in the domain to use hardware resources on the associated XSB. You must have platform administrator privileges to run this command.

Note – The same XSB can be assigned to an LSB in multiple domains. That allows either of the domains to add the board to them. However, it can only be added to a single domain at a time with the addboard command.

The syntax of the `setdcl` command is:

```
setdcl -d domain_id [-a lsb=xsb] [-p policy=value] [-s
variable=value lsb] [-r lsb]
```

Options and Parameters

The options and parameters for this command are:

`-d domain_id` – Specifies the domain ID to be set. An integer ranging from 0 to 23 can be specified, depending on the system configuration.

-a lsb=xsb – Specifies an XSB number to be associated with a LSB number in the domain. lsb is an integer ranging from 0 to 15. xsb is in the form of *xx-y* where *xx* can be in the range of 00-15 and *y* can be in the range of 0-3. lsb=xsb can be repeated multiple times by using a space character as a delimiter.

-p policy=*value* – Specifies a degradation range applicable for a detected error during initial hardware diagnosis. This setting can be made only once. One of the following can be specified for *value:*

fru – If an error occurs during diagnosis, degradation by component occurs.

xsb – If an error occurs, degradation by XSB occurs.

system – If an error occurs, degradation by domain occurs.

-s *variable=value* – Makes settings regarding hardware resources of the XSB associated with a LSB. One of the following can be specified for variable:

no-mem – Whether to omit the use of memory. If no-mem is specified for variable, either of the following can be specified for value:

true – Omits the use of memory by the domain.

false – Does not omit the use of memory by the domain (default).

no- io – Whether to omit the use of I/ O devices. If no- io is specified for variable, either of the following can be specified for value:

true – Omits the use of I/ O devices in a domain.

false – Does not omit the use of I/ O devices in a domain (default).

float - Whether to set a priority for the board as a floating board, relative to other boards. If float is specified for variable, either of the following can be specified for value:

true – Gives a higher priority regarding floating boards.

false – Does not give a higher priority regarding floating boards (default).

`- r lsb` – Clears the XSB number associated with a LSB number in the specified domain.

In the following example, XSB 00-0 is assigned to LSB 0 for domain 0.

```
XSCF> setdcl -d 0 -a 0=00-0
```

The `showdcl` Command

The `showdcl` command displays the current DCL. You can get information about all of the domains by using the `-a` option and for a specific domain by using the `-d` with the `domain_id` option.

In the following example, the XSB 00-0 is assigned to LSB 0 and it is part of domain 0, which is currently powered off.

```
XSCF> showdcl -a
DID LSB     XSB   System
00                Powered Off
     00     00-0
```

This next example of the `showdcl` command on a M9000+ server shows the same XSB, XSB 08-0 as part of the domain component list of both domain 0 and 1. The other interesting piece of this output is that DID 0 is running and DID 1 is at the Open Boot PROM. Our next section on the `addboard` and `showboards` commands will prove to us that the DCL does not show us what is currently configured into our domains.

```
XSCF> showdcl -a
DID   LSB   XSB   System
00                Running
      00    00-0
      01    01-0
      02    02-0
      04    08-0
      05    09-0
      06    10-0

01                OpenBoot Execution Completed
      00    08-0

02                Powered Off
      00    08-1

03                Powered Off
      00    08-2

04                Powered Off
      00    08-3
```

The `addboard` Command

The `addboard` command, based on the DCL, assigns, attaches, and configures an XSB to the specified domain. The `-c` option specifies the transition of the board from the current configuration state to the new configuration state.

Configuration states are `assign`, `configure`, and `reserve`. If the `-c` option is not specified, the default expected configuration state is `configure`.

You must have platform administrator or domain administrator privileges to execute this command.

The syntax of the `addboard` command is:

`addboard [-q] [-y | -n] [-f] [-v] -c` *`function`* `-d` *`domain_id`* `xsb`

Options and Parameters

The options and parameters for this command are:

`-q` – Suppresses all messages to stdout including prompts. Must be used with either the `-y` or `-n` option.

`-y` – Automatically answers yes to all prompts. Prompts are displayed unless used with the `-q` option.

`-n` – Automatically answers no to all prompts. Prompts are displayed unless used with the `-q` option.

`- f` – Forcibly incorporates an XSB into a domain for which no diagnosis has been performed.

`-v` – Displays a detailed message.

`-c` *`function`*, where *`function`* can be:

`assign` -	Assigns an XSB into the domain configuration.
`configure` –	Configures an XSB into the domain configuration. If the `-c` option is not specified, then `-c configure` is used by default.
`Reserve` –	Reserves incorporation of an XSB into the domain configuration. The action of reserve is the same as assign.

- `-d` *`domain_id`* – Specifies the ID of the domain to which an XSB is to be configured or to which it is to be assigned. The `domain_id` can be 0–23 depending on the system configuration.
- `xsb` – Specifies the XSB number to be configured or assigned. Multiple xsb operands are permitted, separated by spaces. The xsb

is in the form of *xx-y*, where *x* is an integer from 00-15 and *y* is an integer from 0–3.

In the following example, XSB 00-0 is configured into domain 0. The responding message is that domain 0 is not currently running, therefore, it is performing a static operation.

```
XSCF> addboard -d 0 -c configure 00-0
XSB#00-0 will be configured into domainID 0. Continue?[y|n] :y
DomainID 0 is not currently running.
```

The showboards Command

The `showboards` command displays information about an XSB.

In the following example, there are three XSBs, 00-0, 00-1 and 00-2 that are assigned to domain 0.

```
XSCF> showboards -a
XSB DID(LSB) Assignment Pwr Conn Conf Test   Fault

00-0 00(00)  Assigned    n    n    n    Unknown Failed
00-1 00(01)  Assigned    n    n    n    Unknown Failed
00-2 00(02)  Assigned    n    n    n    Unknown Failed
00-3 SP      Unavailable n    n    n    Fail    Failed
```

The following example displays the `showboards` output for the 9000+ server.

```
XSCF> showboards -a
XSB DID(LSB) Assignment Pwr  Conn Conf Test   Fault

00-0 00(00) Assigned    y    y    y    Passed Normal
01-0 00(01) Assigned    y    y    y    Passed Normal
02-0 00(02) Assigned    y    y    y    Passed Normal
08-0 01(00) Assigned    y    y    y    Passed Normal
08-1 02(00) Assigned    y    n    n    Passed Normal
08-2 03(00) Assigned    y    n    n    Passed Normal
08-3 04(00) Assigned    y    n    n    Passed Normal
09-0 00(05) Assigned    y    y    y    Passed Normal
10-0 00(06) Assigned    y    y    y    Passed Normal
```

From this output, you can see in the highlighted line that XSB 08-0 is currently assigned to DID 1. Another interesting thing to note is in the output of the `showboards` command for domain 0 below.

```
XSCF> showboards -d 0
 XSB   DID(LSB) Assignment  Pwr   Conn  Conf  Test   Fault

 00-0  00(00)   Assigned    y     y     y    Passed  Normal
 01-0  00(01)   Assigned    y     y     y    Passed  Normal
 02-0  00(02)   Assigned    y     y     y    Passed  Normal
 08-0  01(00)   Assigned    y     y     y    Passed  Normal
 09-0  00(05)   Assigned    y     y     y    Passed  Normal
 10-0  00(06)   Assigned    y     y     y    Passed  Normal
```

In this output XSB 08-0 is still shown. That is because the `showboards` command uses the information from the domain's DCL to display its output. Because XSB 08-0 is in the DCL for both domains 0 and 1 it appears in both of their board output even though it can only be assigned to one domain. If you look closely at the highlighted line in this output, you will see in the second column that XSB 08-0 is assigned to DID 1.

The `deleteboard` Command

The `deleteboard` command removes an XSB from the domain to which it is currently assigned. The `-c` option specifies the transition of the board from the current configuration state to the new configuration state.

Configuration states are `disconnect`, `unassign`, and `reserve`. If the `-c` option is not specified, the default expected configuration state is `disconnect`.

You must have platform administrator or domain administrator privileges to execute this command.

The syntax of the `deleteboard` command is:

`deleteboard [-q] [-y | -n] [-f] [-v] -c` *`function`* `xsb`

Options and Parameters

The options and parameters for this command are:

- `-c` *`function`*, where *`function`* can be:

- `disconnect` – Disconnects the XSB from the domain configuration but keeps it assigned. Because the XSB remains assigned to the domain configuration, it can be configured again in the domain by a reboot or the execution of the `addboard` command.
- `unassign` – Completely disconnects the XSB from the main configuration and puts it in the system board pool. The XSB in the system board pool can be incorporated into or assigned to another domain.
- `reserve` – Does not immediately disconnect the XSB from the domain configuration but only reserves detachment. When the domain power is shut down, the reserved XSB is disconnected from the domain configuration and put back in the system board pool.

In the following example, XSB 00-2 is deleted from the domain that it is currently assigned to.

```
XSCF> deleteboard 00-2
XSB#00-2 will be unconfigured from domain immediately. Continue?[y|n] :y
XSCF> showboards -a
XSB DID(LSB) Assignment Pwr Conn Conf Test   Fault

00-0 00(00)  Assigned    n   n    n    Unknown Failed
00-1 00(01)  Assigned    n   n    n    Unknown Failed
00-2 SP      Unavailable n   n    n    Fail    Failed
00-3 SP      Unavailable n   n    n    Fail    Failed
```

The `moveboard` Command

The moveboard command moves an XSB from its current domain to another. The -c option specifies the transition of the board from the current configuration state to the new configuration state.

Configuration states are configure, assign, and reserve. If the -c option is not specified, the default expected configuration state is configure.

You must have platform administrator or domain administrator privileges to execute this command.

The syntax of the moveboard command is:

moveboard [-q] [-y | -n] [-f] [-v] -c *function* -d *domain_id* xsb

Options and Parameters

The options and parameters for this command

-c *function*, where *function* can be:

- assign – Disconnects a configured XSB from its domain configuration and assigns it to the specified destination domain configuration.
- configure – Disconnects a configured XSB from its domain configuration and configures it into the specified destination domain configuration. If the - c option is not specified, then - c configure is used by default.
- reserve – Reserves disconnection of the specified XSB from the source domain, and reserves assignment of the XSB to the destination domain. The XSB is assigned to the destination domain when the source domain is turned off or rebooted. The XSB is subsequently incorporated into the destination when the domain power is turned on or on reboot.

In the following example, XSB 00-0 is being moved to domain 1.

```
XSCF> moveboard -d 1 00-0
XSB#00-0 will be configured into domainID 1. Continue?[y|n] :y
DomainID 1 is not currently running.
```

The `setdomainmode` Command

setdomainmode - set the modes of operation for the specified domain

setdomainmode [[-q] -{y|n}] -d domain_id -m function=mode

setdomainmode -h

The modes of operation for the specified domain include the following types:

Diagnostics Level	OpenBoot PROM diagnostic levels. The default is standard.
Secure Mode	Whether to enable or disable the host watchdog and suppress break signal reception. The default of the host watchdog is enable and suppress break signal reception is enable.
Autoboot	Whether to enable or disable the auto boot function used at domain startup. The default is enable.
CPU Mode	Way of determining the CPU opera-tional mode mounted on the domain. The CPU operational mode can be automatically determined at domain startup, or manually set to the com-patible mode. The default is to let it automatically determined at domain startup.

The CPU operational mode includes the following two types:

SPARC64 VII enhanced mode

Operates using the enhanced functions of SPARC64 VII processor. This mode is set to the domain consists only of SPARC64 VII processors and when the CPU operational mode determined automatically.

SPARC64 VI compatible mode

All the mounted CPUs operate with the functions equivalent to the SPARC64 VI processor. This mode can be set to a domain of any CPU configuration.

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In the following example, `autoboot` is set to `off` for domain 0.

```
XSCF> setdomainmode -d 0 -m autoboot=off
Diagnostic Level   :min      -> -
Secure Mode        :off      -> -
Autoboot           :on       ->
off
Specified modes is set.
Continue? [y|n] :y
configured.
Diagnostic Level   :min
Secure Mode        :off (host watchdog: unavailable Break-
signal :receive)
Autoboot         :off (autoboot:off)
```

The `showdomainmode` Command

The `showdomainmode` command displays the current mode settings for the domain.

In the following example, you can see the domain modes that are set for domain 0.

```
XSCF> showdomainmode -d 0
Host-ID :803a9275
Diagnostic Level   :min
Secure Mode        :off (host watchdog: unavailable
Break-signal:receive)
Autoboot         :off (autoboot:on)
```

The `setdomparam` Command

The setdomparam command forcibly toggles OBP environment variables. You must have platform administrator or domain administrator privileges to run this command.

The syntax of the setdomparam command is:

setdomparam -d *domain_id* [use-nvramrc] [security-mode] [set-defaults]

Options and Parameters

The options and parameters for this command are:

- use-nvramrc – Sets the use-nvramrc? variable to false.
- security-mode – Sets the security-mode? variable to none.
- set-defaults – Restores the OBP variables to their defaults. In

the following example, use-nvramrc? is set to false for domain 0.

```
XSCF> setdomparam -d 0 use-nvramrc
OpenBoot PROM variable use-nvram will be set to false.
Continue? [y|n]: y
```

Controlling Power to the Domain

After the domain has been configured, it then needs to have power applied to the boards and POST run against them. You apply power to the boards by executing the `poweron` command.

The `poweron` Command

The `poweron` command is used to power on the specified domain or all domains. A user with platform administrator or field engineer privileges can run this command for all domains. A user with domain administrator or domain manager privileges can run this command for their respective domain.

The syntax of the `poweron` command is:

```
poweron [[-q] - {y|n}] [-M] -d
domain_id poweron [[-q] -{y|n}] [-M]
-a
poweron -h
```

Options and Parameters

The only option or parameter for this command is `-a`, which turns on power to every domain that has been completely setup.

In the following example, power is applied to domain 0.

```
XSCF> poweron -d 0
DomainIDs to be powered
on:0 Continue? [y|n] :y
00 :Powered on
```

The `poweroff` Command

The `poweroff` command is used to power off the specified domain or all domains. After the OS is shut down in an orderly fashion, the power is turned off. A user with platform administrator or field engineer privileges can run the `poweroff` command for all domains. A user with domain administration or domain manager privileges can run the `poweroff` command for their respective domain.

The syntax of the `poweroff` command is:

```
poweroff [[-q] -{y|n}] [-f] [-M] -d domain_id
poweroff [[-q] -{y|n}] [-M] -a
poweroff -h
```

Options and Parameters

The only option or parameter for this command is `-a`, which turns off power to every domain that is running.

In the following example, we are connected into the serial console and power is turned off to domain 0.

```
XSCF> poweroff -d 0
DomainIDs to be powered off:0
Continue? [y|n] :y
00 :Powered off
XSCF> Aug 3 15:26:26 pts-ff1-25-0 XSCF [460] : XSB Stop Complete.
unitno:0000000000000001 trigger:00004000

Aug 3 15:26:26 pts-ff1-25-0 XSCF [463] : SEQUENCE:COMPLETE (0x05000901)

Aug 3 15:26:26 pts-ff1-25-0 XSCF [460] : CMU Stop Complete.
unitno:0000000000000001 trigger:00008000

Aug 3 15:26:26 pts-ff1-25-0 XSCF [460] : IOU Stop Complete.
unitno:0000000000000001 trigger:00008000

Aug 3 15:26:27 pts-ff1-25-0 XSCF [460] : System Clock Stop Complete.
```

```
unitno:0000000000000000 trigger:00008000

Aug 3 15:26:49 pts-ff1-25-0 XSCF [463] : SEQUENCE:COMPLETE (0x02ff0b01)

XSCF>
```

Accessing the Domain Console

After logging into the service processor, a domain administrator must become a domain client on the service processor. After doing so, the domain administrator can run commands that affect the domain of which you are a client. The command to perform this action is `console`.

The `console` Command

The `console` command creates a remote connection to the domain's virtual console driver, making the window in which the command is run a console window for the specified domain (domain_id). Many console commands can be attached simultaneously to a domain, but only one console has write permissions; all others have read-only permissions.

A user with platform administrator, platform operator, or field engineer privileges can run this command for all domains. A user with domain administrator, domain manager, or domain operator privileges can run this command for their accessible domain.

To exit the domain console and return to the XSCF shell, press the Enter key, and then type a '#.'.

The syntax of the `console` command is:

`console -d` *`domain_id`* `[-y] [-f | -r] [-e` *`escapeChar]`*

Options and Parameters

The options and parameters for this command are:

- `- f` – Forces a write session.
- `- r` – Initiates a read-only session.
  - `- e` *`escapeChar`* – Allows you to specify an escape character sequence if you want to change the default. The character specified must be enclosed in double quotation marks ("").

In the following example, a console is opened to domain 0.

```
XSCF> console -d 0
Connect to DomainID 0?[y|
n] :y {10} ok
```

The `showconsolepath` Command

The `showconsolepath` command displays information about the domain console that is currently connected. The following information can be displayed:

- user – User account on the XSCF that is connected to the domain console
- DID – Domain ID
- ro/ rw – Domain console type; read-only or read-write
- date – Date connected to the domain console.

A user with user platform administrator, platform operator, or user administrator privileges can run this command for all domains. A user with domain administrator, domain manager, or domain operator privileges can run this command for their respective domain.

The syntax of the `showconsolepath` command is:

`showconsolepath [-a] [-d` *`domain _id]`*

In the following example, the console path is shown for all domains that can be accessed.

```
XSCF> showconsolepath -a
 user    DID  ro/rw date
 student00    rw    Fri Jul 29  21:23:34
 joe      00  ro    Fri Jul 29  09:49:12
 mary     01  rw    Fri Jul 29  13:52:23
```

Displaying the Domain Devices and Status

The XSCF software provides multiple ways for you to gather information about the domains configured in your system. This section provides information about the following two commands:

The `showdevices` command

The `showdomainstatus` command

The `showdevices` Command

The `showdevices` command displays configured physical devices on XSBs. The information about available resources can be obtained for the devices managed by the OS.

A user with platform administrator, platform operator, or field engineer privileges can run this command for all domains. A user with domain administrator, domain manager, or domain operator privileges can run this command for their respective domain.

The following types of information are displayed:

Common:

- DID – Domain ID
- XSB – XSB number

CPU:

- ID – Processor ID
- State – Status of processor
- Speed – CPU frequency (MHz)
- ecache – CPU external cache size (MB)

Memory:

Board memory – Size of memory mounted on XSB (MB)

Permanent memory – Size of permanent memory

Base address – Physical address of memory mounted on XSB

Domain memory – Size of memory on the domain (MB)

I/O devices:

Device – Instance name of I/O device

resource – Managed resource name

usage – Description of the instance using resources

query – Results of an off-line inquiry about resources

The syntax of the `showdevices` command is:

```
showdevices [-v] [-p bydevice | byboard | query | force]
    [xsb | -d domain_id]
```

Options and Parameters

The options and parameters for this command are:

`-p bydevice` – Displays results organized by device type

`-p byboard` – Displays results organized by XSB

`-p force` – Predicts system resources deleted from the OS when a board is forcibly disconnected by the `deleteboard - f` command

`-p query` – Predicts system resources deleted from the OS when a system board is disconnected by the `deleteboard` command

```
XSCF> showdevices -d 0
CPU:
----
DID XSB  id  state    speed  ecache
00   00-00   on-line   2280       0
00   00-01   on-line   2280       0
00   00-02   on-line   2280       0
00   00-03   on-line   2280       0
00   00-08   on-line   2280       0
00   00-09   on-line   2280       0
00   00-010  on-line   2280       0
00   00-011  on-line   2280       0
00   00-016  on-line   2280       0
00   00-017  on-line   2280       0
00   00-018  on-line   2280       0
00   00-019  on-line   2280       0
00   00-024  on-line   2280       0
00   00-025  on-line   2280       0
00   00-026  on-line   2280       0
00   00-027  on-line   2280       0

Memory:

         board perm base                 domain target deleted remaining


DID XSB mem MB mem MB address             mem MB  XSB  mem MB  mem MB
00 00-0 65536     2407 0x000003c000000000 65536

IO Devices:

DID XSB      device resouce              usage
sd0                 /dev/dsk/c0t0d0s0     mounted filesystem "/"
sd0                 /dev/dsk/c0t0d0s1     swap area
sd0                 /dev/dsk/c0t0d0s1     dump device (swap)
sd0                 /dev/dsk/c0t0d0s7     mounted filesystem "/export/home"
bge0                SUNW_network/bge0     bge0 hosts IP addresses: 10.6.15.2
XSCF>
```

Note – The CPU ID values are described in the upcoming section about the OBP device tree.

The `showdomainstatus` Command

The `showdomainstatus` command displays the current domain component list (DCL). This command requires one of the privileges to execute: `platadm, platop, fieldeng,` or `useradm.`

One of the following states is displayed for each domain:

`Powered Off` – Power is off.

`Panic State` – A panic occurred, and the domain is in the reset state.

`Shutdown Started` – The power-off process is starting.

`Initialization Phase` – OpenBoot PROM initialization is in progress.

`OpenBoot Execution Completed` – The system is in the OpenBoot PROM (ok prompt) state.

`Boot ing/OpenBoot PROM prompt` – The operating system is booting. Or due to the domain shutdown or reset, the system is in the OpenBoot PROM running state or is suspended in the OpenBoot PROM (ok prompt) state.

`Running` – Operating system is running.

`-` – The domain is not configured.

The syntax of the `showdomainstatus` command is:

```
showdomainstatus -a
showdomainstatus -d
domain_id
showdomainstatus -h
```

Options and Parameters

The options and parameters for this command are:

- `-a` – Displays status information about all domains that can be accessed

- `-d` *`domain_id`* – Displays the specified domain, where *`domain_id`* can be 0–23 depending on the system configuration
- `-h` – Displays command usage

Sample Command Output

The following example displays information for all configured domains:

```
XSCF> showdomainstatus -a
DID Domain
Status 00
Running
01 -
02 Powered Off
03 Panic State
04 Shutdown Started
05 Boot ing/OpenBoot PROM prompt
06 Initialization Phase
07 OpenBoot Execution Completed
```

Resetting the Domain

Certain error conditions can occur in a domain that require aborting the domain software or issuing a reset to the domain software or hardware.

The `reset` Command

XSCF provides the `reset` command, which aborts the domain software and issues a reset to the domain hardware.

Control is passed to the OBP after the `reset` command is issued. If a user-initiated `reset` command is issued, the OBP uses its default configuration to determine whether the domain is booted to the Solaris OS.

A user with platform administrator or field engineer privileges can run this command for all domains. A user with domain administrator or domain manager privileges can run this for their respective domains only.

The syntax of the `reset` command is:

`reset [-y] -d` *`domain_id`* `level`

Options and Parameters

The following three levels of resets can be specified:

`por` – Resets the domain system.

`Panic` – Instructs the domain OS to generate a panic. The command is ignored if issued during power-off or shutdown.

`xir` – Resets the domainCPU.

In the following example, an XIR is issued to

domain 0.

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XSCF> **reset -d 0 xir**

```
DomainID to be
reset:0 Continue?
[y|n] :y
00 :Reseted
```

The `sendbreak` Command

The `sendbreak` command sends a break signal to the specified domain. When a break signal is sent from the domain console to the domain OS, control is transferred from the OS to the OBP and the OBP prompt (`ok`) is displayed.

A user with platform administrator privileges can run this command for all domains. A user with domain administrator privileges can run this for their domain only.

The syntax of the `sendbreak` command is:

`sendbreak -d` *`domain_id`*

In the following example, a break is sent to domain 0 and then a console session is opened. You can verify that the domain is at the OBP `ok` prompt.

```
XSCF> sendbreak -d 0
Send break signal to DomainID 0?[y|n] :y
XSCF> console -d 0
Connect to DomainID 0?[y|n] :y

{10} ok
```

Exploring the OBP Device Tree

The OBP directly handles hardware devices in the system. Each device has a unique name representing the type of device and the location of that device in the system addressing structure.

After the domain completes POST, the available healthy devices are identified to the domain. The OpenBoot PROM represents the interconnected buses and their attached devices as a tree of nodes. This tree is called the device tree. A node representing the host computer's main physical address bus forms the tree's root node.

Each device node in the tree can have:

- *Properties* – Data elements describing the node and its capabilities and configuration
- *Methods* – The software procedures that access the device
- *Data* – The initial value of the private data used by the methods
- *Children* – Other device nodes *attached* to a given node and that lie directly below it in the device tree
- A *parent* – The node that lies directly above a given node in the device tree

Nodes with children usually represent buses and their associated controllers, if any. Each node defines a physical address space in which the device drivers communicate with the devices at and below that node. Each child of that node is assigned a physical address in a section of the parent's address space.

Nodes without children are called leaf nodes and generally represent devices. However, some nodes represent system-supplied firmware services or other objects.

The OBP Device Tree

The following example shows an OBP device tree for a mid-range domain using the OBP `show-devs` command.

```
{10} ok show-devs
/pci@3, 700000
/pci@2, 600000
/pci@1, 700000
/pci@0, 600000
/pci@8, 4000
/cmp@418, 0
/cmp@410, 0
/pseudo-mc@200,200
/nvram
/pseudo-console
/virtual-memory
/memory@m3c000000000
/aliases
/options
/openprom
/chosen
/packages
/pci@0, 600000/pci@0
/pci@0, 600000/pci@0/pci@9
/pci@0, 600000/pci@0/pci@8
/pci@0, 600000/pci@0/pci@8/pci@0, 1
/pci@0, 600000/pci@0/pci@8/pci@0
/pci@0, 600000/pci@0/pci@8/pci@0/network@2, 1
/pci@0, 600000/pci@0/pci@8/pci@0/network@2
/pci@0, 600000/pci@0/pci@8/pci@0/scsi@1
/pci@0, 600000/pci@0/pci@8/pci@0/scsi@1/disk
/pci@0, 600000/pci@0/pci@8/pci@0/scsi@1/tape
/pci@8, 4000/ebus@1
/pci@8, 4000/ebus@1/panel@14, 280030
/pci@8, 4000/ebus@1/scfc@14, 200000
/pci@8, 4000/ebus@1/serial@14, 400000
/pci@8, 4000/ebus@1/flashprom@10, 0
/cmp@418, 0/core@1
/cmp@418, 0/core@0
/cmp@418, 0/core@1/cpu@1
```

```
/cmp@418, 0/core@1/cpu@0
/cmp@418, 0/core@0/cpu@1
/cmp@418, 0/core@0/cpu@0
/packages/SUNW,
built in-drivers
```

{10} ok

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Device Paths

OPL DC Server

On an OPL DC box, a Physical System Board (PSB) consists of a CMU (and if it is installed) an IOU A

PSB may be CMU + IOU or or just CMU. You can not have a PSB with just an IOU.

sb 0 = CMU#0 + IOU#0
sb 1 = CMU#1 + IOU#1
sb 2 = CMU#2 + IOU#2
......

sb 15 = CMU#15 + IOU#15

PSBs are partitioned into eXtended System Boards (XSB) which come in two flavours:

Uni-XSB, where the XSB comprises all of the PSB
Quad-XSB, where an XSB comprises 1 x CPUM and 8 x DIMMs (for I/O details see below)

Domains (range 0 - 23) are created from Logical System Boards (LSB) which are the units of CPU, Mem and I/O which Solaris sees.

LSBs range from 0 – 15
An LSB consists of an XSB (Uni or Quad)

Any XSB can be assigned to any LSB

So, a CMU (if it has it's corresponding IOU) can be partitioned into four domains.

But, be aware...
Even though an IOU has four HDDs, you can not have one HDD per quad-XSB.

XSB#0 has HDD#0 and HDD#1
XSB#2 has HDD#2 and HDD#3

So, although the data centre IOU has four internal disks, you *can not* have one disk as a boot device for each domain created from a quad-XSB.

Not also, that slots 0 & 4 must have an IOUA (IOU onboard device card_A) installed, which provides the SAS controller for the disks, GbE connections plus DVD and DAT

OPL FF Server

There is 1 x Physical System Board (PSB) in an M4000:

sb0 = CPUM#0, CPUM#1, MEMB#0, MEMB#1, MEMB#2, MEMB#3 and IOU#0

There are 2 x PSBs in an M5000:

sb0 = CPUM#0, CPUM#1, MEMB#0, MEMB#1, MEMB#2, MEMB#3 and IOU#0
sb1 = CPUM#2, CPUM#3, MEMB#4, MEMB#5, MEMB#6, MEMB#7 and IOU#1

PSBs are partitioned into eXtended System Boards (XSB) which come in two flavours:

Uni-XSB, where the XSB comprises all of the PSB
Quad-XSB, where an XSB comprises 1/2 x CPUM and 1 X MEMB (for I/O details see below)

Domains (range 0 - 3) are created from Logical System Boards (LSB) which are the units of CPU, Mem and I/O which Solaris sees.

LSBs range from 0 – 15
An LSB consists of an XSB (Uni or Quad)

Any XSB can be assigned to any LSB

Some config rules:

An M4000 can be partitioned into two domains. There is one PSB on an M4000, and so this must be split into quad XSBs.

An M5000 can be partitioned into four domains. There are two PSBs on an M5000, and each PSB must be split into quad XSBs.

But, be aware, Only XSB#0 and XSB#1 have I/O assigned to them.

XSB#2 and XSB#3 have no I/O

XSB#0 gets pci@0,600000 and pci@1,700000 plus disks and GbE
XSB#1 gets pci@2,600000 and pci@3,700000

For how this relates to slot layout see below

So a suggested layout is as below:

domain0 = XSB#00-0 + XSB#00-2
domain1 = XSB#00-1 + XSB#00-3
domain2 = XSB#01-0 + XSB#01-2 (FF2 only)
domain3 = XSB#01-1 + XSB#01-3 (FF2 only)

The second thing to note, is although the M4000 has two internal disks, you *can not* have one disk as a boot device for each domain. The only I/O resource for DID1 (domain ID 1) is IOU slots 3 & 4

CPU Decoding

The following is an extract of infodoc: 207439 (formerly: 88851)

Reminder :

- SPARC64 VI chip has two physical cores and each core has two strands (or virtual CPUs).
- SPARC64 VII chip has four physical cores and each core has two strands (or virtual CPUs).

SPARC64 VI[I] chips are either mounted :
* on the MBU for Mid-Range Servers (M4000 + M5000),
* on a CMU for High-End Servers (M8000 + M9000).

- PSB : a PSB (Physical System Board) consists of up to 4 CPUs, up to 32 DIMMs and one IOU (optional).

- XSB : In the eXtended System Board, the PSB can be either one complete unit (Uni-XSB) or divided into four subunits (Quad-XSB).

- LSB : A logical unit name of an XSB to which a logical number (LSB number) is assigned. LSB is used together with an LSB number when domains are constructed and it is referred to by the Solaris OS.

Decoding the IDs :

OpenBoot device tree :

The processor is represented as three level node structure in OpenBoot device tree (N = portid).
For SPARC64 VI, this can be represented as following :

```
                               cmp(/cmp@N)
                                    |
                     -----------------------------
                    |                              |
                    |                              |
          core  (/cmp@N/core@0)            core  (/cmp@N/core@1)
                    |                              |
           ---------------                ---------------
          |                |             |                |
          |                |             |                |
cpu  (/cmp@N/core@0/cpu@0)  |             |        cpu  (/cmp@N/core@1/cpu@1)
                           |             |
         cpu  (/cmp@N/core@0/cpu@1)    cpu  (/cmp@N/core@1/cpu@0)
```

SPARC64 VII has 4 cores.

The portid is defined as :

```
[10]  = 1
[9]   = LSB_ID[4] = 0
[8:5] = LSB_ID[3:0]
[4:3] = Chip_ID
[2:0] = 0
```

10	9	8 7 6 5	4 3	2 1 0
1	0	LSB_ID	CHIP_ID	0 0 0

LSB ID : Logical System Board on which this SPARC64 VI[I] chip is mounted (0-15 for OPL)
CHIP ID : SPARC64 VI[I] chip number on specified LSB (0-3)

Note that the representation in OBP is always Hex-numbers.

Example while browsing the OpenBoot device tree of a M9000 domain composed of 3 XSBs (SPARC64 VI) :

```
{11} ok show-devs
[...]
/cmp@458,0/core@1
/cmp@458,0/core@0
/cmp@458,0/core@1/cpu@1
/cmp@458,0/core@1/cpu@0
/cmp@458,0/core@0/cpu@1
/cmp@458,0/core@0/cpu@0
/cmp@450,0/core@1
/cmp@450,0/core@0
/cmp@450,0/core@1/cpu@1
/cmp@450,0/core@1/cpu@0
/cmp@450,0/core@0/cpu@1
/cmp@450,0/core@0/cpu@0
/cmp@448,0/core@1
/cmp@448,0/core@0
/cmp@448,0/core@1/cpu@1
/cmp@448,0/core@1/cpu@0
/cmp@448,0/core@0/cpu@1
/cmp@448,0/core@0/cpu@0
/cmp@440,0/core@1
/cmp@440,0/core@0
/cmp@440,0/core@1/cpu@1
/cmp@440,0/core@1/cpu@0
/cmp@440,0/core@0/cpu@1
/cmp@440,0/core@0/cpu@0
[.....]
```

To decode the logical location for /cmp@450,0/core@1/cpu@0, we need to decode the portid :

```
{2} ok cd /cmp@450,0/core@1/cpu@0
{2} ok .properties
status                   okay
device_type              cpu
name                     cpu
cpuid                    00000052
reg                      00000000

x450 ==> 10001010000
```

10	9	8 7 6 5	4 3	2 1 0
1	0	0 0 1 0	1 0	0 0 0

hence, in this case,

```
LSB_ID = 02
CHIP_ID = 2

/cmp@450,0/core@1/cpu@0 ==> ( LSB_ID 02 / CHIP_ID 2 ) / core@1 / cpu@0
```

For SPARC64 VII, there is no difference when calculating the portid, only the core ID will change. Example :

```
{e} ok show-devs
[...]
/cmp@418,0/core@3
/cmp@418,0/core@2
/cmp@418,0/core@1
/cmp@418,0/core@0
/cmp@418,0/core@3/cpu@1
/cmp@418,0/core@3/cpu@0
/cmp@418,0/core@2/cpu@1
/cmp@418,0/core@2/cpu@0
/cmp@418,0/core@1/cpu@1
/cmp@418,0/core@1/cpu@0
/cmp@418,0/core@0/cpu@1
/cmp@418,0/core@0/cpu@0
[...]
```

Solaris :

Solaris[TM] device paths and messaging reference the ID of a given processor, generally in a Decimal representation, via the cpuid (prtdiag, psrinfo, /var/adm/messages, panic string ...) :

The cpuid is defined as :

```
[9]   = LSB_ID[4] = 0
[8:5] = LSB_ID[3:0]
[4:3] = Chip_ID
[1:2] = Core_ID
[0]   = Strand_ID
```

9	8 7 6 5	4 3	2 1	0
0	LSB_ID	Chip_ID	Core_ID	Strand_ID

For SPARC64 VI :
. the Core_ID is either 0 or 1.
. the Strand_ID is either 0 or 1.

For SPARC64 VII :
. the Core_ID is 0, 1, 2 or 3.
. the Strand_ID is either 0 or 1.

From the previous example from a M9000 system (SPARC64 VI), the cpuid used by Solaris associated with /cmp@450,0/core@1/cpu@0 is x52 :

```
{2} ok cd /cmp@450,0/core@1/cpu@0
{2} ok .properties
status                    okay
device_type               cpu
name                      cpu
cpuid                     00000052
reg                       00000000
```

To decode the cpuid :

```
x52 ==> 0001010010
```

9	8 7 6 5	4 3	2 1	0
0	0 0 1 0	1 0	0 1	0

```
LSB_ID    = 02
Chip_ID   = 2
Core_ID   = 1
Strand_ID = 0

x52(82) => LSB_ID 02 / CHIP_ID 2 / core@1 / cpu@0
```

This can be confirmed from a prtdiag from the domain :

```
==================================== CPUs ====================================

   CPU                 CPU              Run       L2$        CPU       CPU
LSB     Chip                 ID              MHz         MB        Impl.     Mask
---     ----       --------------------  ----        ---        -----     ----
00       0          0,    1,    2,    3   2280       5.0           6       146
00       1          8,    9,   10,   11   2280       5.0           6       146
00       2         16,   17,   18,   19   2280       5.0           6       146
00       3         24,   25,   26,   27   2280       5.0           6       146
01       0         32,   33,   34,   35   2280       5.0           6       146
01       1         40,   41,   42,   43   2280       5.0           6       146
01       2         48,   49,   50,   51   2280       5.0           6       146
01       3         56,   57,   58,   59   2280       5.0           6       146
02       0         64,   65,   66,   67   2280       5.0           6       146
02       1         72,   73,   74,   75   2280       5.0           6       146
02       2         80,   81,   82,   83   2280       5.0           6       146
02       3         88,   89,   90,   91   2280       5.0           6       146
```

Note that the representation in Solaris is always Dec-numbers.

```
# psrinfo
[...]
75      on-line   since 02/14/2007 16:09:08
80      on-line   since 02/14/2007 16:09:08
81      on-line   since 02/14/2007 16:09:08
82      on-line   since 02/14/2007 16:09:08
83      on-line   since 02/14/2007 16:09:08
88      on-line   since 02/14/2007 16:09:08
[...]

# psrinfo -vp
[...]
The physical processor has 4 virtual processors (80-83)
 SPARC64-VI (portid 1024 impl 0x6 ver 0x92 clock 2280 MHz)
[...]
```

A similar reasoning is applicable to SPARC64-VII.

```
{e} ok cd /cmp@418,0/core@3/cpu@1
{e} ok .properties
status                   okay
device_type              cpu
name                     cpu
cpuid                    0000001f
reg                      00000001
```

To decode the cpuid :

```
x1f ==> 0000011111
```

9	8 7 6 5	4 3	2 1	0
0	0 0 0 0	1 1	1 1	1

```
LSB_ID    = 00
Chip_ID   = 3
Core_ID   = 3
Strand_ID = 1

x1f(31) => LSB_ID 00 / CHIP_ID 3 / core@3 / cpu@1
```

This can be confirmed from a prtdiag from the domain :

```
# prtdiag -v
[...]
==================================== CPUs ====================================

     CPU                 CPU                           Run    L2$    CPU   CPU
LSB   Chip                ID                            MHz     MB    Impl. Mask
---   ----  ----------------------------------------  ----   ---    ----- ----
00     0      0,   1,   2,   3,   4,   5,   6,   7   2520   5.0        7  144
00     1      8,   9,  10,  11,  12,  13,  14,  15   2520   5.0        7  144
00     2     16,  17,  18,  19,  20,  21,  22,  23   2520   5.0        7  144
00     3     24,  25,  26,  27,  28,  29,  30,  31   2520   5.0        7  144

# psrinfo -vp
The physical processor has 4 cores and 8 virtual processors (24-31)
 The core has 2 virtual processors (24 25)
 The core has 2 virtual processors (26 27)
 The core has 2 virtual processors (28 29)
 The core has 2 virtual processors (30 31)
   SPARC64-VII (portid 1048 impl 0x7 ver 0x90 clock 2520 MHz)
```

cpuid cheat sheets :

Relationship between the LSB numbers and the starting processor numbers, in hexidecimal/decimal format (applicable to both SPARC64 VI and SPARC64 VII chips) :

LSB Number	CPU Chip 0	CPU Chip 1	CPU Chip 2	CPU Chip 3
00	00/00	08/08	10/16	18/24
01	20/32	28/40	30/48	38/56
02	40/64	48/72	50/80	58/88
03	60/96	68/104	70/112	78/120
04	80/128	88/136	90/144	98/152
05	a0/160	a8/168	b0/176	b8/184
06	c0/192	c8/200	d0/208	d8/216
07	e0/224	e8/232	f0/240	f8/248
08	100/256	108/264	110/272	118/280
09	120/288	128/296	130/304	138/312
10	140/320	148/328	150/336	158/344
11	160/352	168/360	170/368	178/376
12	180/384	188/392	190/400	198/408
13	1a0/416	1a8/424	1b0/432	1b8/440
14	1c0/448	1c8/456	1d0/464	1d8/472
15	1e0/480	1e8/488	1f0/496	1f8/504

How to map the logical location to the physical location ?

At this stage, we know the logical location of the processor : LSB#02.
This LSB can be mapped to any XSB in the platform.
To determine the physical location of the component, a 'showboards -v' for the domain can be collected from the active XSCF.

```
XSCF> showboards -v -d 0
XSB  R DID(LSB) Assignment  Pwr  Conn Conf Test    Fault    COD
---- - -------- ----------- ---- ---- ---- ------- -------- ----
00-0   00(00)   Assigned    y    y    y    Passed  Normal   n
01-0   00(01)   Assigned    y    y    y    Passed  Normal   n
02-0   00(02)   Assigned    y    y    y    Passed  Normal   n
```

From the output, LSB 02 is associated to XSB#02-0.
So, cpuid 82 is pointing to the strand#0 of the core#1 of the chip#2 on the CMU (it's a M9000) in slot 2.

Another example

This reasoning is applicable to the Mid-Range Servers (M4000 + M5000) and High-End Servers (M8000 + M9000); for domain composed of Uni and Quad XSB.

Let's have a look at the same portid/cpuid (x450/x52(82))

```
{12} ok cd /cmp@450,0/core@1/cpu@0
{12} ok .properties
status                   okay
device_type              cpu
name                     cpu
cpuid                    00000052
reg                      00000000
```

We know from the previous decoding that :

```
- /cmp@450,0/core@1/cpu@0 ==> ( LSB_ID 02 / CHIP_ID 2 ) / core@1 / cpu@0
- x52(82) => LSB_ID 02 / CHIP_ID 2 / core@1 / cpu@0
```

prtdiag from the domain confirms that cpuid 82 is the strand#0 of the core#1 of the chip#2 on the LSB#02

```
==================================== CPUs ====================================

      CPU                 CPU              Run        L2$        CPU      CPU
LSB    Chip                ID               MHz         MB        Impl.    Mask
---    ----       --------------------    ----        ---       -----    ----
00       0          0,   1,   2,   3    2280        5.0          6       146
00       1          8,   9,  10,  11    2280        5.0          6       146
00       2         16,  17,  18,  19    2280        5.0          6       146
00       3         24,  25,  26,  27    2280        5.0          6       146
01       3         56,  57,  58,  59    2280        5.0          6       146
02       2         80,  81,  82,  83    2280        5.0          6       146
03       1        104, 105, 106, 107    2280        5.0          6       146
04       0        128, 129, 130, 131    2280        5.0          6       146
```

But in this example, the physical mapping is as follows :

```
XSCF> showboards -v -d 1
XSB  R DID(LSB) Assignment  Pwr  Conn Conf Test    Fault    COD
---- - -------- ----------- ---- ---- ---- ------- -------- ----
08-0   01(00)   Assigned    y    y    y    Passed  Normal   n
10-0   01(04)   Assigned    y    y    y    Passed  Normal   n
10-1   01(03)   Assigned    y    y    y    Passed  Normal   n
10-2   01(02)   Assigned    y    y    y    Passed  Normal   n
10-3   01(01)   Assigned    y    y    y    Passed  Normal   n
```

So, in this case, LSB 02 is assigned to a Quad-XSB#10-2.
Therefore cpuid 82 is pointing to the strand#0 of the core#1 of the chip#2 on the CMU (it's a M9000) in slot 10.

IOU device paths

M4000/M5000

ASIC Layout on IOU on FF systems

```
                                         ___
                            ___     |   |-- LSI1064  (Internal disks)
     ___________           |   |--|NEC|-- Dual BGE (Internal GbE)
    | Oberon    |     --|PLX|   |___|--[ PCI-X Slot IOU#0-PCI#0
    |  ______   | x8|   |___|---------[ PCI-E Slot IOU#0-PCI#1
    | |      |-|---
System| | Fire | | x8
------| |______|-|--------------------[ PCI-E Slot IOU#0-PCI#2
Bus   |  ______   | x8
    | |      |-|--------------------[ PCI-E Slot IOU#0-PCI#3
    | | Fire | | x8
    | |______|-|--------------------[ PCI-E Slot IOU#0-PCI#4
    |___________|
```

Addresses from Oberon

```
   For LSB#0

      ___________
     | Oberon    |
     |  ______   |
     | |      |-|---pci@0,600000--------------
System| | Fire | |
------| |______|-|---pci@1,700000--------------
Bus  |  ______   |
     | |      |-|---pci@2,600000--------------
     | | Fire | |
     | |______|-|---pci@3,700000--------------
     |___________|
```

PCI-E to PCI-E Switch

```
                 ___
                |   |---pci@8---
-----pci@0---|PLX|
                |___|---pci@9---

          PCI-E to PCI-E
            Switch chip
```

PCI-E to PCI-X Bridge

```
          ___
         |   |---pci@0--------  LSI1064  (Internal disks)
         |   |              |
---------|NEC|              -----Dual BGE (Internal GbE)
         |   |
         |___|---pci@0,1-----  -[ PCI-X Slot IOU#0-PCI#0
```

HDD#0 = /pci@0,600000/pci@0/pci@8/pci@0/scsi@1/sd@0,0
HDD#1 = /pci@0,600000/pci@0/pci@8/pci@0/scsi@1/sd@1,0

And the internal Gb ethernet ?

From explorer.80dcaeff.sa n-ff2-3-a-2006.06.14.01.55/sysconfig/prtconf-v.out

dev_path=/pci @0,600000/pci @0/pci @8/pci @0/network@2: bge0
dev_path=/pci@0,600000/pci@0/pci@8/pci@0/network@2,1: bge1

The following is an extract of infodoc 203831 (formerly 88915)

Sun SPARC Enterprise M4000 and Sun SPARC Enterprise M5000 IOU0 Table:

Device	**Type**	**UniMode**	**QuadMode**	**Device Path**
IOU0 HD0	SAS/SATA	XSB XX-0	XSB XX-0	/pci@[LSB1]0,600000/pci@0/pci@8/pci@0/scsi@1/disk0
IOU0 HD1	SAS/SATA	XSB XX-0	XSB XX-0	/pci@[LSB1]0,600000/pci@0/pci@8/pci@0/scsi@1/disk1
CD/DVD	SCSI	XSB XX-0	XSB XX-0	/pci@[LSB1]0,600000/pci@0/pci@8/pci@0/scsi@1/disk3
DAT	SCSI	XSB XX-0	XSB XX-0	/pci@[LSB1]0,600000/pci@0/pci@8/pci@0/scsi@1/tape
BGE0	10/100/1000 HDX/FDX	XSB XX-0	XSB XX-0	/pci@[LSB1]0,600000/pci@0/pci@8/pci@0/network@2
BGE1	10/100/1000 HDX/FDX	XSB XX-0	XSB XX-0	/pci@[LSB1]0,600000/pci@0/pci@8/pci@0/network@2,1
IOU Slot 0	PCI-X	XSB XX-0	XSB XX-0	/pci@[LSB1]0,600000/pci@0/pci@8/pci@0,1
IOU Slot 1	PCIe	XSB XX-0	XSB XX-0	/pci@[LSB1]0,600000/pci@0/pci@9
IOU Slot 2	PCIe	XSB XX-0	XSB XX-0	/pci@[LSB1]1,700000
IOU Slot 3	PCIe	XSB XX-0	XSB XX-1	/pci@[LSB2]2,600000
IOU Slot 4	PCIe	XSB XX-0	XSB XX-1	/pci@[LSB2]3,700000

Sun SPARC Enterprise M5000 IOU1 Table:

Device	**Type**	**UniMode**	**QuadMode**	**Device Path**
IOU1 HD2	SAS/SATA	XSB XX-0	XSB XX-0	/pci@[LSB3]0,600000/pci@0/pci@8/pci@0/scsi@1/disk0
IOU1 HD3	SAS/SATA	XSB XX-0	XSB XX-0	/pci@[LSB3]0,600000/pci@0/pci@8/pci@0/scsi@1/disk1
BGE0	10/100/1000 HDX/FDX	XSB XX-0	XSB XX-0	/pci@[LSB3]0,600000/pci@0/pci@8/pci@0/network@2
BGE1	10/100/1000 HDX/FDX	XSB XX-0	XSB XX-0	/pci@[LSB3]0,600000/pci@0/pci@8/pci@0/network@2,1
IOU Slot 0	PCI-X	XSB XX-0	XSB XX-0	/pci@[LSB3]0,600000/pci@0/pci@8/pci@0,1
IOU Slot 1	PCIe	XSB XX-0	XSB XX-0	/pci@[LSB3]0,600000/pci@0/pci@9
IOU Slot 2	PCIe	XSB XX-0	XSB XX-0	/pci@[LSB3]1,700000
IOU Slot 3	PCIe	XSB XX-0	XSB XX-1	/pci@[LSB4]2,600000
IOU Slot 4	PCIe	XSB XX-0	XSB XX-1	/pci@[LSB4]3,700000

M8000/M9000

Asic layout on DC systems.

```
                                          ___
                                         |   |--pci@0------LSI1064  (Internal disks)---
                               ---------|NEC|
       __________                        |   |
      | Oberon   |              |        |___|--pci@0,1----Dual BGE (Internal GbE)-----
      |  ______  |              |
      | |      |-|--pci@0,600000---------------------------[ PCI-E Slot IOU#0-PCI#0----
System| | Fire | |
------| |______|-|--pci@1,700000---------------------------[ PCI-E Slot IOU#0-PCI#1----
Bus   |  ______  |
      | |      |-|--pci@2,600000---------------------------[ PCI-E Slot IOU#0-PCI#2----
      | | Fire | |
      | |______|-|--pci@3,700000---------------------------[ PCI-E Slot IOU#0-PCI#3----
      |__________|
                                          ___
                                         |   |--pci@0------LSI1064  (Internal disks)---
                               ---------|NEC|
       __________                        |   |
      | Oberon   |              |        |___|--pci@0,1----Dual BGE (Internal GbE)-----
      |  ______  |              |
      | |      |-|--pci@4,600000---------------------------[ PCI-E Slot IOU#0-PCI#4----
System| | Fire | |
------| |______|-|--pci@5,700000---------------------------[ PCI-E Slot IOU#0-PCI#5----
Bus   |  ______  |
      | |      |-|--pci@6,600000---------------------------[ PCI-E Slot IOU#0-PCI#6----
      | | Fire | |
      | |______|-|--pci@7,700000---------------------------[ PCI-E Slot IOU#0-PCI#7----
      |__________|
```

XSB#0 gets pci@0,600000 and pci@1,700000 plus HDD#0 and HDD#1

XSB#1 gets pci@2,600000 and pci@3,700000

XSB#2 gets pci@4,600000 and pci@5,700000 plus HDD#2 and HDD#3

XSB#3 gets pci@6,600000 and pci@7,700000

The following is an extract of infodoc 205724 (formerly 88916)

There are two important factors that impact how the Sun SPARC Enterprise M8000 and Sun SPARC Enterprise M9000-32 and Sun SPARC Enterprise M9000-64

device paths are arranged: The I/O architecture and the assignment of the Logical System Board (LSB).

When allocating resources to a domain through the Domain Control List (DCL), the OPL equivalent of an access control list, these resources are also assigned to a Logical System Board (LSB).

In addition, the Sun SPARC Enterprise M8000 and M9000 provides an optional IOUA PCIe HBA which when installed into PCIe slots 0, 2, 4, or 6 provides access to two onboard 10/100/1000 HDX/FDX ethernet ports as well as connections to additional internal devices, such as the hard disks located on the IOU, and the platform's DVD/CDROM and DAT devices, depending on where the IOUA is installed. Note that access to the IOU's hard disks and platform DVD and DAT is only possible through an IOUA PCIe HBA. Also, installing the IOUA in slots 1, 3, 5, and 7 is not supported.

The following table represents the same device path information shown above presented in a table format:

Slot	I/O Device	Type	Uni Mode	Quad Mode	Device Path
HBA Slot 0		PCIe	XX-0	XX-0	/pci@[LSB1]0,600000
	IOUA - Net 0	10/100/1000 HDX/FDX	XX-0	XX-0	/pci@[LSB1]0,600000/network@1
	IOUA - Net 1	10/100/1000 HDX/FDX	XX-0	XX-0	/pci@[LSB1]0,600000/network@1,1
	IOU - HD0	SAS/SATA	XX-0	XX-0	/pci@[LSB1]0,600000/pci@0/scsi@1/disk@0
	IOU - HD1	SAS/SATA	XX-0	XX-0	/pci@[LSB1]0,600000/pci@0/scsi@1/disk@1
	Platform DVD	SCSI	XX-0	XX-0	/pci@[LSB1]0,600000/pci@0/scsi@1/disk@4
	Platform Tape	SCSI	XX-0	XX-0	/pci@[LSB1]0,600000/pci@0/scsi@1/tape@5
HBA Slot 1		PCIe	XX-0	XX-0	/pci@[LSB1]1,700000
HBA Slot 2		PCIe	XX-0	XX-1	/pci@[LSB2]2,600000
	IOUA - Net 0	10/100/1000 HDX/FDX	XX-0	XX-1	/pci@[LSB2]2,600000/network@1
	IOUA - Net 1	10/100/1000 HDX/FDX	XX-0	XX-1	/pci@[LSB2]2,600000/network@1,1
	Platform DVD	SCSI	XX-0	XX-1	/pci@[LSB2]2,600000/pci@0/scsi@1/disk@4
	Platform Tape	SCSI	XX-0	XX-1	/pci@[LSB2]2,600000/pci@0/scsi@1/tape@5
HBA Slot 3		PCIe	XX-0	XX-1	/pci@[LSB2]3,700000

HBA Slot 4		PCIe	XX-0	XX-2	/pci@[LSB3]4,600000
	IOUA - Net 0	10/100/1000 HDX/FDX	XX-0	XX-2	/pci@[LSB3]4,600000/network@1
	IOUA - Net 1	10/100/1000 HDX/FDX	XX-0	XX-2	/pci@[LSB3]4,600000/network@1,1
	IOU - HD2	SAS/SATA	XX-0	XX-2	/pci@[LSB3]4,600000/pci@0/scsi@1/disk@0
	IOU - HD3	SAS/SATA	XX-0 < /p>	XX-2	/pci@[LSB3]4,600000/pci@0/scsi@1/disk@1
	Platform DVD	SCSI	XX-0	XX-2	/pci@[LSB3]4,600000/pci@0/scsi@1/disk@4
	Platform Tape	SCSI	XX-0	XX-2	/pci@[LSB3]4,600000/pci@0/scsi@1/tape@5
HBA Slot 5		PCIe	XX-0	XX-2	/pci@[LSB3]5,700000
HBA Slot 6		PCIe	XX-0	XX-3	/pci@[LSB4]6,600000
	IOUA - Net 0	10/100/1000 HDX/FDX	XX-0	XX-3	/pci@[LSB4]6,600000/network@1
	IOUA - Net 1	10/100/1000 HDX/FDX	XX-0	XX-3	/pci@[LSB4]6,600000/network@1,1
	Platform DVD	SCSI	XX-0	XX-3	/pci@[LSB4]6,600000/pci@0/scsi@1/disk@4
	Platform Tape	SCSI	XX-0	XX-3	/pci@[LSB4]6,600000/pci@0/scsi@1/tape@5
HBA Slot 7		PCIe	XX-0	XX-3	/pci@[LSB4]7,700000

Device Mapping IO Expansion Box

When the host server is booted, the OpenBoot PROM creates a map of devices internal and external to the host server. When mapping the external devices, the OpenBoot PROM starts from the host's I/O Unit (IOU) slots. For the External I/O Expansion Unit, the device map includes circuitry in the I/O boats, the PCI cards in the I/O boats, and the external devices that are connected to the PCI cards.

Note – The External I/O Expansion Unit's link cards and link cable do not appear in the device map. When you install a link card in the host server, the OpenBoot PROM will not detect that card. After you connect the link cable(s) between the link card in the host server and the link card in an I/O boat, the OpenBoot PROM can detect circuitry and any PCI cards in the I/O Boat.

The host server's IOU slots are identified by various device path names such as

/pci@x0,600000,/pci@x1,700000,/pci@x2,600000,

and soforth. These names vary according to the location of the I/O unit (IOU) in the host, and by the slot location in the I/O unit.

IOU Slots in SPARC Enterprise M4000/M5000 Servers

IOU Slot	OpenBoot PROM Device Path Name
IOU Slot 0*	`/pci@x0, 600000/pci@0/pci@8/pci@0,1`
IOU Slot 1	`/pci@x0, 600000/pci@0/pci@9`
IOUSlot2	`/pci@x1,700000`
IOUSlot3	`/pci@x2,600000`
IOUSlot4	`/pci@x3,700000`

* Slot 0 is a PCI-X slot. The External I/O Expansion Unit link card cannot be used in this slot.

IOU Slots in SPARC Enterprise M8000/M9000 Servers

IOU Slot	OpenBoot PROM Device Path Name
IOUSlot0	`pci@x0,600000`
IOU Slot 1	`pci@x1 ,700000`
IOU Slot 2	`pci@x2,600000`
IOUSlot3	`pci@x3,700000`
IOUSlot4	`pci@x4,600000`
IOUSlot5	`pci@x5,700000`
IOUSlot6	`pci@x6,600000`
IOUSlot7	`pci@x7,700000`

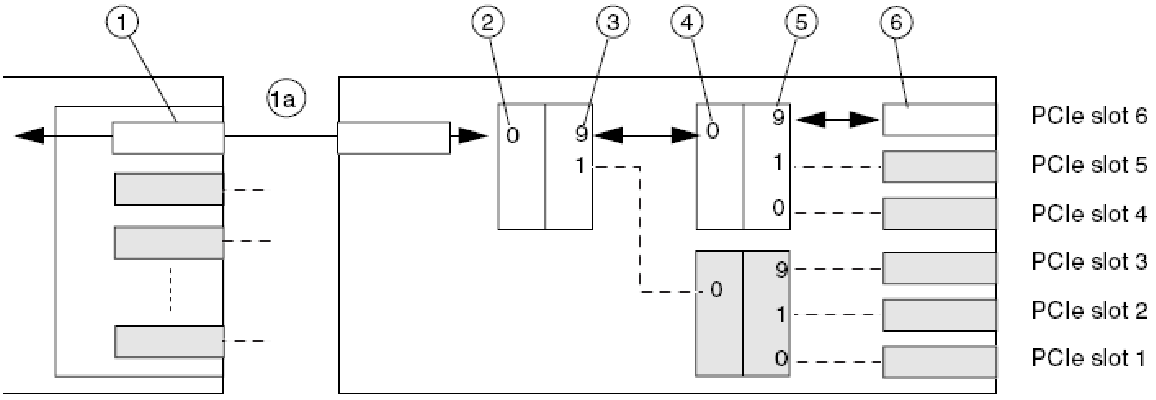
The OpenBoot PROM maps several types of connecting devices inside the I/O boats in the External I/O Expansion Unit. These connecting devices generally have multiple I/O ports which appear in the OpenBoot PROM report as `pci@0, pci@1, pci@0, 1,` and so forth. These connecting devices are switching circuits which switch between multiple inputs, and bridge circuits, which connect PCI-X buses to PCI Express buses.

Device Map for PCI Express Cards

This is an example of a complete device path for a PCI Express (PCIe) card in a PCI Express boat:

/*IOU_slot*/pci@0 /pci@9 /pci@0 /pci@9 /*abc@n*

IOU_slot is the IOU slot to which the link card for a External I/O Expansion Unit) is connected.



Parts of a Device Path for a PCI Express I/O Boat

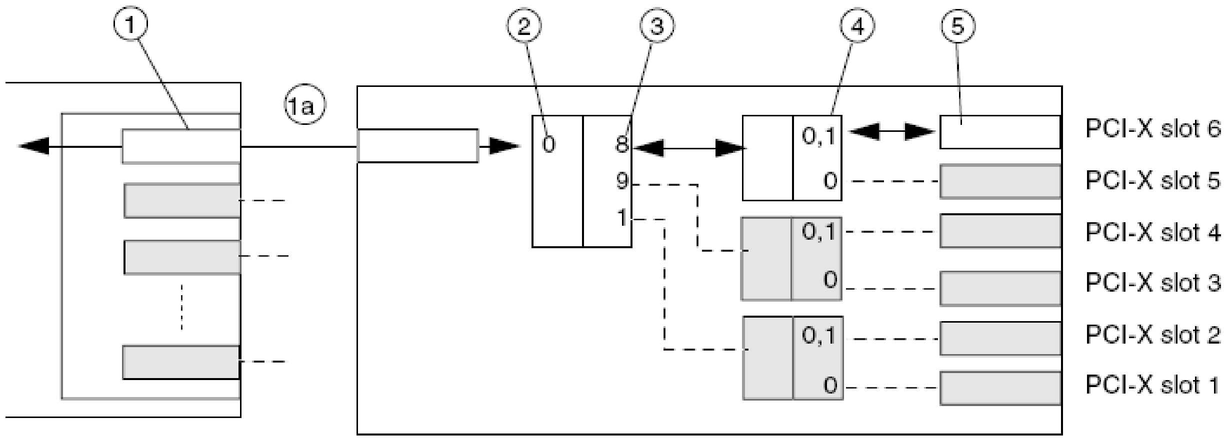
Item	Description	Device Tree Path Example
1	IOUslot	`/pci@`*xy*`,700000`
1 a	link cards	(Nothing is displayed for link cards. This is normal behavior. They are not visible to the OpenBoot PROM.)
2	`/pci@0`	`/pci@`*xy*`,700000/pci@0`
3	`/pci@9`	`/pci@`*xy*`,700000/pci@0/pci@9`
4	`/pci@0`	`/pci@`*xy*`,700000/pci@0/pci@9/pci@0`
5	`/pci@9`	`/pci@`*xy*`,700000/pci@0/pci@9/pci@0/pci@9`
6	PCI card	`/pci@`*xy*`,700000/pci@0/pci@9/pci@0/pci@9/`*abc@n*

Device Map for PCI-X Cards

This is an example of a complete device path for a PCI-X card in a PCI-X boat:

/*IOU_slot*/pci@0 /pci@8 /pci@0 /*abc@n*

IOU_slot is the IOU slot to which the link card for a External I/O Expansion Unit is connected.



Parts of a Device Path for a PCI-X I/O Boat

Item	Description	Device Tree Path Example
1	IOU slot	`/pci@`*xy*`,700000`
1 a	link cards	(Nothing is displayed for link cards. This is normal behavior. They are not visible to the OpenBoot PROM.)
2	`/pci@0`	`/pci@`*xy*`,700000/pci@0`
3	`/pci@8`	`/pci@`*xy*`,700000/pci@0/pci@8`
4	`/pci@0`	`/pci@`*xy*`,700000/pci@0/pci@8/pci@0`
5	*PCI card*	*/pci@xy,700000/pci@0/pci@8/pci@0,1/abc@n*

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Capacity On Demand

Capacity on Demand

This chapter describes how to manage system resources with the Capacity on Demand (COD) feature of your server.

Note - The COD feature is available only on high-end servers and those midrange servers designated as COD models. If you have a midrange server that is not a COD model, the information in this section does not apply.

This chapter contains these sections:

- About Capacity on Demand
- XSCF Shell Procedures for Using COD
- Related Information

For information on ordering and purchasing COD licenses, refer to the *COD User's Guide* for your server.

About Capacity on Demand

Capacity on Demand is an option that allows you to purchase spare processing resources (CPUs) for your server. The spare resources are provided in the form of one or more CPUs on COD boards that are installed on your server.

However, to access these COD CPUs, you must first purchase the COD right-to-use (RTU) licenses for them. Under certain conditions, you can use COD boards before entering the license information.

Note - The term *COD board* refers to a COD system board in a high-end server, and to a single-board COD model midrange server.

These sections provide details:

- COD Boards
- COD License Purchase
- License Installation
- License Allocation
- Headroom Management
- License Violations

COD Boards

A COD board is a system board that has been configured at the factory for COD capability. COD boards come in the same configurations as standard system boards. The number of CPUs per COD board depends on the configuration of your server.

COD boards are subject to the same limitations for mixed architectures and CPU speeds as system boards. Likewise, COD board software requirements, such as the Solaris OS or OpenBoot PROM version, are the same as those of system boards. Your server can have any combination of COD and system boards. It can even be configured entirely with COD boards.

Once a COD board has been licensed, you can configure it into domains in the same way as a system board. Until it has been activated (using licenses or headroom), however, you cannot configure it into a domain.

COD boards are identified by a special field-replaceable unit (FRU) ID and by a COD label. Except for their FRU ID, label, and COD capability, once COD boards are licensed, they are handled by the rest of the hardware and software in exactly the same way as system boards. COD boards fully support dynamic reconfiguration operations.

You can order COD boards either when you order your server, in which case they arrive already installed, or as an option. The SPARC Enterprise M4000 and M5000 servers cannot add option COD boards after shipment from the factory; COD capability for these two servers must be ordered with the server.

For more information about COD boards and replacing COD boards (field-replaceable units, or FRUs) in your server, see the *COD User's Guide* and the *Service Manual.*

COD License Purchase

The purchase of a COD RTU license entitles you to receive a license *key*, which enables the appropriate number of COD processors. A license key can grant access to multiple RTUs.

A COD license is assigned to a specific server, one license per processor (CPU). All the licenses assigned to a server are handled as a floating pool of licenses for all the COD processors installed on that server. For example, if you have a server with two COD boards with four processors each, but you will only use six of those processors, all you need is six licenses. Those six licenses can be used by all eight processors, but only six at a time.

At least 50 license keys can be installed on a your server. A COD license has no expiration date.

A COD license can be used by any COD processor on the server. However, the license cannot be moved from one server to another. If COD processors are moved to another server, the license becomes invalid.

License Installation

A license key is comprised of text lines, which can be added to the COD license database. A single license key can grant access to multiple RTUs, as specified when the key is generated.

After you purchase a license, you must install the license keys in the COD license database. The license database is stored in nonvolatile memory on the Service Processor. In a system with more than one Service Processor, failover of the COD license database is supported. COD locks its license keys to the individual Chassis HostID of the system.

Note - In case the license database is lost or corrupted, make sure you keep copies of your licenses and license keys.

One way to preserve copies of your licenses and license keys is to save the output of the `showcodlicense -v` command. You can cut-and-paste the this output to restore any lost license keys. For example:

```
XSCF> showcodlicense -v
Description  Ver    Expiration  Count   Status
-----------  ---    ----------  -----   ------
PROC         01     NONE        3       GOOD
01:803a9241:000000002:0301010100:3:00000000:XXXXXXXXXXXXXXXXXXXXXX
PROC         01     NONE        2       GOOD
01:803a9241:000000003:0301010100:2:00000000:XXXXXXXXXXXXXXXXXXXXXX
XSCF>
```

To restore lost licenses, enter a command similar to the following for each lost license:

```
XSCF> addcodlicense
01:803a9241:000000002:0301010100:3:00000000:XXXXXXXXXXXXXXXXXXXXXX
```

License Allocation

The XSCF firmware allocates COD licenses automatically on a first-come, first-served basis. However, you can reserve licenses if you want to make sure a specific number of COD licenses are allocated to a particular domain.

Licenses are allocated to COD resources either when a domain with a COD board is powered on or when a new COD board is installed and powered on.

At board power on, the Service Processor determines which processing resources are in working order and requests licenses for them. The XSCF firmware checks its license database and current usage, determines which boards are COD boards, and allocates licenses to their resources. It then tells the Service Processor which resources to configure into the domain.

The Service Processor configures only the COD resources approved by the XSCF firmware. Any COD resource that remains unlicensed is not configured into the domain and is assigned a `COD-disabled` status.

When you remove a COD board from a domain through a reconfiguration operation, when a domain containing a COD board is shut down normally, or when the Service Processor detects a fault and unconfigures a board from the domain, the COD licenses for the resources on those boards are released and added to the pool of available licenses.

License allocation does not change during a Service Processor reboot or failover. All licenses remain allocated to their resources.

You can reserve COD licenses for specific domains by using the `setcod` command. After power on, reserved licenses are first allocated to their domains, and then remaining licenses are allocated on a first-come, first-served basis to the remaining resources. When a domain is powered off, the reverse happens: first the unreserved licenses are released to the pool, then the reserved licenses are released.

For example, assume your server had 10 COD licenses and you reserved them for these domains:

```
PROC RTUs reserved for domain 0: 4
PROC RTUs reserved for domain 1: 2
PROC RTUs reserved for domain 2: 0
PROC RTUs reserved for domain 3: 0
```

When the domains were first powered on, four licenses would be assigned to domain 0 and two licenses to domain 1. The remaining four licenses would be available on a first-come, first-served basis to all four domains (0, 1, 2, and 3).

Headroom Management

Caution - Before using headroom, be sure to read and understand the relevant topics in the *SPARC Enterprise M4000/M5000/M8000/M9000 Capacity on Demand (COD) User's Guide*.

Headroom is the capability to use up to four COD processors per server before entering the license information.

By default, COD resources arrive with headroom disabled. You can use the `setcod` command to establish it. However, if all your COD resources are already licensed, configuring headroom will have no effect. In that case, you need to install additional COD boards to retain your headroom capacity. You can also reduce or disable headroom at any time.

While headroom is in use, warning messages appear on the console every four hours. Once you either deactivate the COD board or obtain a license for the resources and enter the license keys, the warning messages stop. When a license key is added, the headroom is automatically reduced by the quantity provided by the license key.

License Violations

A license violation occurs if more resources are in use than are currently licensed on the server. These events can cause a license violation:

- The license database is lost or corrupted while the system is running. This state is detected on the subsequent reboot.

This situation can be remedied by reentering the missing license keys, using the `addcodlicense` command.

- You delete COD licenses with the force option (`deletecodlicense -f`) while the server is still using those licenses.

This could be a valid action in certain cases. For example, you might want to delete unwanted COD licenses, but want to delay shutting down the domain.

- You disable headroom while the server is still using those resources.

Once the system detects a license violation, the Service Processor will post a notice on the server console and ensure that no additional COD resources are brought online until the violation is corrected. In the meantime, it will not shut down domains or COD resources.

XSCF Shell Procedures for Using COD

This section describes these tasks:

- To Install a COD License
- To Delete a COD License
- To Reserve Licenses for Allocation
- To Increase or Decrease Headroom
- To Disable Headroom
- To Display COD Information
- To Display COD License Status
- To Display Usage Statistics for COD Resources

To Install a COD License

This procedure installs a COD license and, if headroom is enabled, decreases headroom to compensate for each new license. This automatic reduction in headroom is designed to avoid accidental abuse of headroom. You can increase headroom again manually after installing the COD license. See To Increase or Decrease Headroom.

1. Log in to the XSCF console with `platadm` privileges.

2. Type the `addcodlicense` command:

```
XSCF> addcodlicense license-signature
```

where *license-signature* is the complete COD license key. For example:

```
XSCF> addcodlicense \
01:84000000:104:0301010100:3:00000000:xxxxxxxxxxxxxxx
```

3. Verify that the license key was added to the license database by typing the `showcodlicense -r` command.

The COD RTU license key that you added should be listed in the `showcodlicense` output. See To Display COD License Status.

To Delete a COD License

Before deleting a license, the XSCF firmware determines whether sufficient licenses are available from the pool of installed licenses plus headroom. If all licenses are in use and no headroom is available, the operation will fail. You can force the operation by using the `-f` option in Step 3, but doing so will overcommit any license reservations that might be in effect.

1. Log in to the XSCF console with `platadm` privileges.

2. Verify that you have enough licenses or headroom to cover COD resources currently in use.

Use the `showcodlicense` command, as described in `To Display COD License Status`. If you do not have sufficient licenses or headroom to compensate, power off one or more domains or disconnect the appropriate number of boards.

3. Type the `deletecodlicense` command:

```
XSCF> deletecodlicense license-signature
```

where *license-signature* is the complete COD license key.

4. Verify that the license key was removed from the license database by typing the `showcodlicense -r` command.

The COD RTU license key that you deleted should not be listed in the `showcodlicense` output. See To Display COD License Status.

To Reserve Licenses for Allocation

You need to reserve licenses only if you want to make sure a specific number of COD licenses are

allocated to a particular domain.

1. Log in to the XSCF console with `platadm` privileges.

2. Type the `setcod` command.

You can use one of two methods, as follows.

- Use `setcod` command with the `-d` *domain_id* and the *license_quantity* options:

```
XSCF> setcod -d domain_id license_quantity
```

For example:

```
XSCF> setcod -d 1 4
```

- Use the `setcod` command with no options.

This option allows you to reserve licenses for all domains at once. First, the number of available licenses (8 in the example below) and the headroom quantity prompt are displayed:

```
XSCF> setcod
COD
---
PROC RTUs installed: 8
PROC Headroom Quantity (0 to disable, 4 MAX) [0]:
```

a. Enter a headroom number or press Return to leave the headroom unchanged.

The following prompts are displayed, in order:

```
PROC RTUs reserved for domain 0 (6 MAX) [0]:
PROC RTUs reserved for domain 1 (6 MAX) [2]:
PROC RTUs reserved for domain 2 (4 MAX) [0]:
PROC RTUs reserved for domain 3 (4 MAX) [0]:
```

b. Enter the number of licenses reserved for each domain.

The currently reserved number appear in parentheses. Do not exceed the number of available licenses. To leave a reservation unchanged, press Return.

3. Verify the allocation with the `showcod` command.

To Increase or Decrease Headroom

1. Log in to the XSCF console with `platadm` privileges.

2. Type the `setcod` command.

You can use one of two methods, as follows.

- Use `setcod` command with the *headroom* option:

```
XSCF> setcod headroom
```

where *headroom* can be a number from 1 to 4. For example:

```
XSCF> setcod 4
```

- Use the `setcod` command with no options.

If you are not sure of the headroom that is available, enter the `setcod` command with no options; the output displays the number of available licenses and the current headroom quantity (a number from 0 to 4).

```
XSCF> setcod
COD
---
PROC RTUs installed: 8
PROC Headroom Quantity (0 to disable, 4 MAX) [0]:4

WARNING: Using headroom requires you to install license key(s) within 30 days.
Do you agree? [y|n]: y
```

You are prompted to enter the *headroom* number. Press Return when finished.

3. Verify the headroom quantity is correct by typing the `showcod` command.

For example, if you entered 4 as the headroom number, the output would be similar to:

```
XSCF> showcod
Chassis HostID: 80d88800
PROC RTUs installed: 8
PROC Headroom Quantity: 4
...
```

To Disable Headroom

1. Log in to the XSCF console with `platadm` privileges.

2. Type the `setcod` command and a headroom number of zero:

```
XSCF> setcod 0
```

3. Verify that the headroom is disabled by typing the `showcod` command.

For example:

```
XSCF> setcod 0

XSCF> showcod
Chassis HostID: 80d88800
PROC RTUs installed: 8
PROC Headroom Quantity: 0
...
```

To Display COD Information

1. Log in to the XSCF console with `platadm`, `platop`, `domainadm`, or `domainop` privileges, or `domainmgr` privileges for a specific domain.

2. Type the `showcod` command.

The output displays the server's Chassis HostID, number of licenses (`PROC RTUs installed`), headroom quantity, and number of licenses reserved for each domain. For example:

```
XSCF> showcod
Chassis HostID: 80e3e446
PROC RTUs installed: 10
PROC Headroom Quantity: 0
PROC RTUs reserved for domain 0: 4
PROC RTUs reserved for domain 1: 0
PROC RTUs reserved for domain 2: 0
PROC RTUs reserved for domain 3: 0
```

To display COD information only for a specific domain, use the `showcod -d` *domain_id* command, where *domain_id* can be 0-23 depending on system configuration.

To Display COD License Status

1. Log in to the XSCF console with `platadm` or `platop` privileges.

2. Type the `showcodlicense` command.

The output displays the resource description, license version number, expiration date, number of licenses, and license status. For example:

```
XSCF> showcodlicense

Description  Ver   Expiration  Count  Status
-----------  ---   ----------  -----  ------
PROC          01         NONE      8  GOOD
```

To display license information in raw key format, use the `-r` option. For example:

```
XSCF> showcodlicense -r

01:84000000:104:0301010100:3:00000000:xxxxxxxxxxxxxxx
```

To display license information in verbose mode, use the -v option. For example:

```
XSCF> showcodlicense -v

Description  Ver   Expiration  Count  Status
-----------  ---   ----------  -----  ------
PROC          01         NONE      1  GOOD
01:84000000:000000001:0301010100:1:00000000:xxxxxxxxxxxxxxxxxxxxxx
PROC          01         NONE      2  GOOD
01:84000000:000000004:0301010100:2:00000000:xxxxxxxxxxxxxxxxxxxxxx
```

To Display Usage Statistics for COD Resources

1. Log in to the XSCF console with platadm or platop privileges, or domainadm, domainop, or domainmgr privileges for a specific domain.

2. Type the showcodusage command.

The output displays a summary of license usage by resource type and for each domain. For example:

```
XSCF> showcodusage

Resource      In Use  Installed  Licensed  Status
--------      ------  ---------  --------  ------
PROC               0          4         0  OK: 0 available
Domain/Resource   In Use  Installed  Reserved
---------------   ------  ---------  --------
0  - PROC              0          4         0
1  - PROC              0          0         0
2  - PROC              0          0         0
3  - PROC              0          0         0
Unused - PROC          0          0         0
```

To display usage statistics only for domains or resources, use the showcodusage -p domain command or the showcodusage -p resource command. All COD usage information can be displayed with the showcodusage -p all command.

You can also use the showboards command to identify which board is a COD board. The output

from this command has a column titled “COD”. This column contains an “n” for a non-COD board or a “y” for a COD board. For example:

```
XSCF> showboards -v -a
XSB  R  DID(LSB)  Assignment  Pwr  Conn  Conf Test    Fault   COD
---  -  --------  ----------  ---  ----  ---- ----     ----   ---
00-0    SP        Unavailable n    n     n    Unknown Normal n
01-0    SP        Unavailable n    n     n    Fail    Failed n
```

```
XSCF> showboards -v -a
XSB  R  DID(LSB)  Assignment  Pwr  Conn  Conf Test    Fault   COD
---  -  --------  ----------  ---  ----  ---- ----     ----   ---
00-0 * 00(00)     Assigned    n    n     n    Unknown Normal y
01-0 * 00(04)     Assigned    n    n     n    Unknown Normal y
```

Log Archiving Facility

Log Archiving Facility

You can set up the Service Processor to automatically archive its log data on a remote host.

This chapter contains these sections:

- About Log Archiving
- Solaris OS Procedures for Log Archiving
- XSCF Shell Procedures for Log Archiving
- Related Information

About Log Archiving

The persistent storage space on a Service Processor is limited. A portion of this space is set aside for logs, such as audit logs and error logs. Due to the limited space, some logs can grow to the point where old log entries must be overwritten or deleted.

These sections provide details on log archiving:

- Using the Log Archiving Facility
- Archive Host Requirements
- Log Archiving Errors
- Using the snapshot Tool

Using the Log Archiving Facility

Log archiving increases the storage space available for logs on the Service Processor by transferring and storing log data on a server known as the *archive host*.

All connections established through log archiving are encrypted. The log archiving feature provides the ability to use an RSA public key to authenticate the archive host. You manage this public key on the Service Processor.

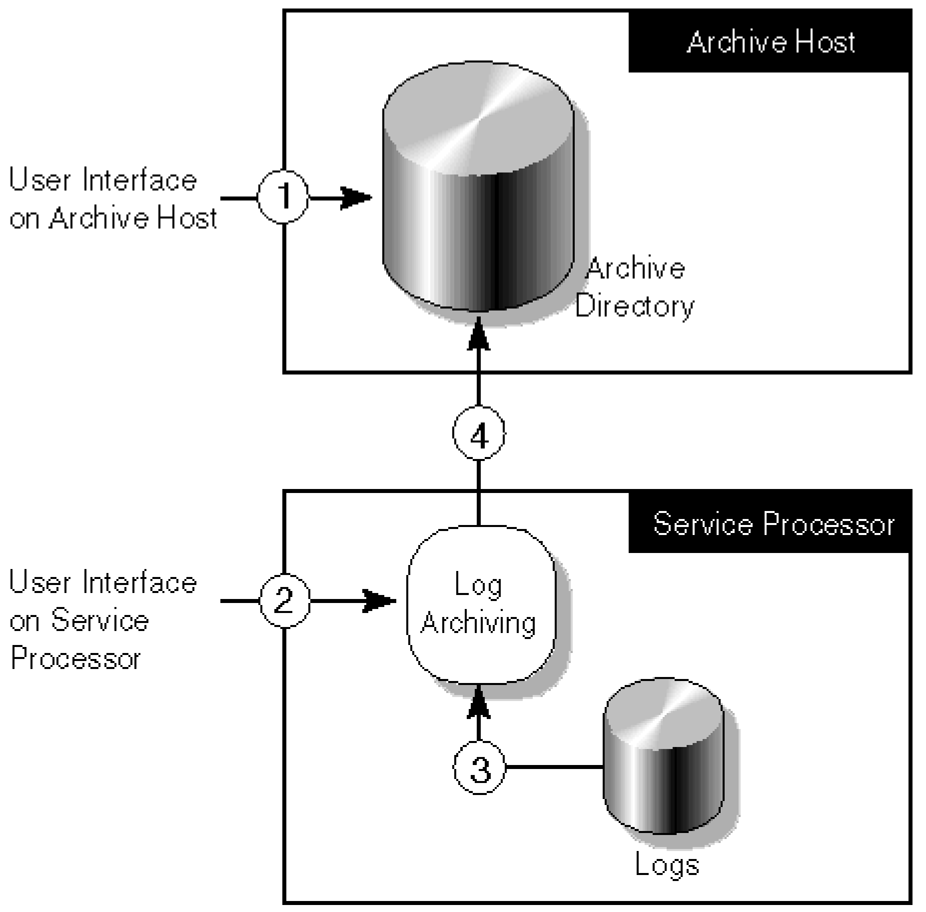
By default, log archiving is disabled. To use log archiving, you set up an archive host, and then enable log archiving on the Service Processor.

When enabled, log archiving periodically uses the secure copy program (`scp`) to transfer new log data to the archive host. Log archiving uses `ssh` to monitor the disk space consumed by archives. It

deletes old archives when necessary, so that the space consumed by the archives will never exceed user-configurable archive space limits. However, for security reasons, log archiving does not automatically delete audit log archives. You can manually delete audit log archives that are no longer needed.

FIGURE 6-1 illustrates how log archiving works.

FIGURE 6-1 Log Archiving



As shown in FIGURE 6-1,

(1) Before enabling log archiving, create an archive directory on the archive host. There should be a separate archive directory for each system that uses the archive host. The directory permissions should be set so that only authorized users can access its contents.

(2) You configure the log archiving feature.

(3) As new data accumulates in logs, log archiving polls log files at fixed intervals to determine when new data needs to be archived.

(4) Log archiving uses `scp` to transfer log data to the archive host. It uses `ssh` to manage the logs which it previously copied.

Archive Host Requirements

As the Service Processor keeps track of archive space on the archive host, you should not store other files in these archive directories.

It is possible to set up the Service Processor so that it uses one of the domains in the same system as an archive host. However, this configuration does not provide optimal reliability and serviceability. Typically, a separate, remote server functions as the archive host.

Log Archiving Errors

The log archiving system handles typical errors by retrying and recording errors in the Event Log. Possible error causes include archive host downtime, network outages, and misconfiguration of the Service Processor and/or the archive host. You can use the `showarchiving` command to view the details of the last ten archiving failures, including the first 1000 characters of output from any command that failed.

Using the `snapshot` Tool

Log data can also be collected and transferred from the Service Processor with the `snapshot` command. The `snapshot` tool does not extend or replace any other functionality, such as log archiving or logging of information using `syslog`. Refer to the `snapshot`(8) `man` page for details on this tool.

Solaris OS Procedures for Log Archiving

To Configure the Log Archive Host

1. Select a user account on the server that will be used as the archive host that the Service Processor will use to log in.

2. Log in to the archive host and create an archive directory.

3. Set the permissions of the archive directory as desired. The Service Processor log-in account must have read, write, and execute (`rwx`) permissions.

XSCF Shell Procedures for Log Archiving

This section describes these tasks:

- To Enable Log Archiving
- To Disable Log Archiving
- To Display Log Archiving Configuration and Status
- To Display Log Archiving Error Details

To Enable Log Archiving

1. Log in to the XSCF console with `platadm` privileges.

2. Type the `setarchiving` command:

```
XSCF> setarchiving -t user@host:directory -r
```

where *user@host:directory* is the user name, log archive host, and directory where the logs are to be stored, and `-r` prompts for the password for `ssh` login. Refer to the `setarchiving man` page for additional options.

3. Type the `setarchiving enable` command:

```
XSCF> setarchiving enable
```

After tests indicate the archive host is set up correctly, log archiving is enabled effective immediately. If the tests fail, you receive an error message that log archiving was not enabled, and the reason why.

To Disable Log Archiving

1. Log in to the XSCF console with `platadm` privileges.
2. Type the `setarchiving` command:

```
XSCF> setarchiving disable
```

To Display Log Archiving Configuration and Status

1. Log in to the XSCF console with `platadm`, `platop`, or `fieldeng` privileges.
2. Type the `showarchiving` command:

```
XSCF> showarchiving
```

To Display Log Archiving Error Details

1. Log in to the XSCF console with `platadm`, `platop`, or `fieldeng` privileges.
2. Type the `showarchiving` command:

```
XSCF> showarchiving -e
```

The details of the last ten archiving failures will be displayed.

Audit Configuration

Audit Configuration

Your server can have multiple domains. Those domains must be as secure as if they were running on physically separate servers. To help ensure that level of security, XSCF firmware provides the audit measures described in this chapter.

This chapter contains these sections:

- About Auditing
- XSCF Shell Procedures for Auditing
- Related Information

About Auditing

The server logs all Service Processor events that could be relevant to security, such as system startup and shutdown, user login and logout, and privilege changes.

An audit record contains information about a single event, what caused it, the time it occurred, and other relevant information. A collection of audit records that are linked is called an audit *trail*. An audit trail can reveal suspicious or abnormal patterns of system behavior, in addition to identifying which user was responsible for a particular event.

Auditing is implemented through:

- Audit Records
- Audit Events
- Audit Classes
- Audit Policy
- Audit File Tools

Audit Records

Audit records are stored in audit files on a 4-megabyte file system on the Service Processor. You cannot change the size reserved for the audit files, but you can transfer the files manually to remote storage at any time. You can also configure auditing for automatic transfers.

Audit files are stored in binary format, although you can export them to XML.

The audit file system switches storage between two partitions. Audit records are stored in one

partition until it becomes full, then new records are stored in the other partition. Records in a full partition can be moved to a remote location, according to the audit policy.

If audit policy or network problems impede remote storage, the system generates an alarm. You can clear space by manually transferring the files to remote storage or by deleting them. Until you clear space, new records are dropped.

Because local space is limited to 4 megabytes, the partitions fill up quickly. If you do not configure audit policy to automatically transfer files to remote storage, you will have to intervene frequently or begin to drop records. If you are unable to maintain consistent audit trails, the utility of the audit system is limited. Typically, you either set up sufficient remote space and automatic transfers or disable the audit capability.

Audit Events

Audit events are:

- Changes to the Service Processor configuration, for example, an IP address change
- Any request to perform an operation on an object protected by the access control policy
- All use of authentication
- Tests of password strength, for example, tests done by the `password` command to check whether a password contains enough non alphabetical characters
- Modifications to the access control attributes associated with an object, for example, changes to controls on which domains a board might be in
- Changes made to user security attributes, for example, password or privileges
- Reading information from the audit records (including unsuccessful attempts)
- Modifications to the audit policy
- Actions taken due to the exceeding of a audit trail size threshold
- Actions taken due to audit storage failure
- Modifications made by administrators to the audit trail
- Changes to the time

The minimum data recorded for each event includes:

- Date and time of the event
- Type of event
- Who caused the event
- Outcome of the event (success or failure)

Audit Classes

Audit classes are categories for grouping and sorting audit events. The server provides a predefined set of audit classes, for example, log-in events and service-related events. You cannot define additional audit classes or change the events in a class. Refer to the `setaudit`(8) `man` page for a list of audit classes.

Audit Policy

Audit policy determines how the auditing feature is implemented at your site. You can configure the following aspects of auditing:

- Whether it is enabled or disabled
- Types of event that are audited
- Which users have their events audited
- Remote directories for storing audit records
- Threshold of local capacity at which a warning is issued
- Action when both audit partitions are full

The default audit policy is as follows:

- Auditing is enabled
- Records are dropped and counted when the audit trail is full
- All events are enabled for auditing
- Global user audit policy is set to enabled
- Per-user audit policy for all users is set to `default` (that is, enabled)
- Audit warning thresholds are set at 80 percent and 100 percent full
- Email warnings are disabled

Audit File Tools

You can manage audit files from the Service Processor, using a tool for viewing audit files. Refer to the `viewaudit`(8) `man` page for details on this tool.

XSCF Shell Procedures for Auditing

This section describes these tasks:

To Enable or Disable Writing of Audit Records to the Audit Trail

1. Log in to the XSCF console with `auditadm` privileges.
2. Type the `setaudit` command:

```
XSCF> setaudit enable|disable
```

where `enable` enables writing of audit records, and `disable` disables writing of audit records.

To Configure an Auditing Policy

1. Log in to the XSCF console with `auditadm` privileges.
2. Type the `setaudit` command:

```
XSCF> setaudit [-p count|suspend] [-m mailaddr] [-a users=enable|disable|default] [-c cla
```

Refer to the `setaudit`(8) `man` page for details on option information.

3. Verify the operation with the `showaudit all` command:

```
XSCF> showaudit all
```

To Display Whether Auditing is Enabled Or Disabled

1. Log in to the XSCF console with `auditadm` privileges.

2. Type the `showaudit` command:

```
XSCF> showaudit
Auditing: enabled
```

To Display Current Auditing Policy, Classes, or Events

1. Log in to the XSCF console with `auditadm` privileges.

2. Type the `showaudit all` command:

```
XSCF> showaudit all
```

Command Listing

Command Listing

User Administration Commands

User Administration Commands

Command	Description	useradm	platadm	platop	domainadm	domainmgr	domainop	auditadm	auditop	fieldeng	Service	Escalation
adduser	Create an XSCF user account	x										x
deleteuser	Delete an XSCF user account	x										x
disableuser	Disable an XSCF user account	x										x
enableuser	Enable an XSCF user account	x										x
password	Manage all user passwords	x										x
password	Manage own password	x	x	x	x	x	x	x	x	x	x	x
setpasswordpolicy	Manage system password policy	x										x
setprivileges	Assign user privileges	x										x
showuser	Display all user account information	x										x

User Administration Commands (Continued)

Command	**Description**	**useradm**	**platadm**	**platop**	**domainadm**	**domainmgr**	**domainop**	**auditadm**	**auditop**	**fieldeng**	**Service**	**Escalation**
`showuser`	Display your user information	x	x	x	x	x	x	x	x	x	x	x
`showpas swordpolicy`	Display current password policy settings	x										x

Network Administration Commands

Network Administration Commands

Command	Description	useradm	platadm	platop	domainadm	domainmgr	domainop	auditadm	auditop	fieldeng	Service	Escalation
shownetwork	Display XSCF network information	x	x	x	x	x	x	x	x	x	x	x
setnetwork	Configure a network interface		x									x
showroute	Display XSCF routing information	x	x	x	x	x	x	x	x	x	x	x
setroute	Configure the routing environment		x									x
showhostname	Display the XSCF hostname	x	x	x	x	x	x	x	x	x	x	x
sethostname	Configure the XSCF hostname		x									x
shownameserver	Display the configured name servers	x	x	x	x	x	x	x	x	x	x	x
setnameserver	Configure a name server		x									x
nslookup	Query the internet name server	x	x	x	x	x	x	x	x	x	x	x
showntp	Display the NTP servers	x	x	x	x	x	x	x	x	x	x	x
setntp	Configure the NTP servers		x									x
showhttps	Display HTTPS service status	x	x	x	x	x	x	x	x	x	x	x
sethttps	Start or stop the HTTPS service		x									x
showtelnet	Display telnet service status	x	x	x	x	x	x	x	x	x	x	x
settelnet	Start or stop the telnet service		x									x
showssh	Display SSH service status	x	x	x	x	x	x	x	x	x	x	x
setssh	Start or stop the SSH service		x									x
showdscp	Set IP addresses for DSCP	x	x	x	x	x	x			x	x	x

Network Administration Commands (Continued)

Command	Description	useradm	platadm	platop	domainadm	domainmgr	domainop	auditadm	auditop	fieldeng	Service	Escalation
`setdscp`	Set the IP addresses for DSCP		x									x
`showsnmp`	Display SNMP agent information	x	x	x	x	x	x	x	x	x	x	x
`setsnmp`	Manage the SNMP agent		x									x
`showsnmpusm`	Display SNMP agent user based security model	x	x	x	x	x	x	x	x	x	x	x
`setsnmpusm`	Configure SNMP agent user based security model		x									x
`showsnmpvacm`	Display SNMP agent view based access control model	x	x	x	x	x	x	x	x	x	x	x
`setsnmpvacm`	Configure SNMP agent view based access control model		x									x
`showemailreport`	Display email reporting data		x	x						x	x	x
`setemailreport`	Configure email reporting data		x									x
`showsmtp`	Display SMTP settings		x	x								x
`setsmtp`	Configure SMTP settings		x									x

Capacity on Demand Administration Commands

Capacity on Demand Administration Commands

Command	Description	useradm	platadm	platop	domainadm	domainmgr	domainop	auditadm	auditop	fieldeng	Service	Escalation
addcodlicense	Install a COD RTU license		x									x
deletecodlicense	Remove a COD RTU license		x									x
enablecodboard	Convert a non-COD board to a COD board										x	x
disablecodboard	Convert a COD-board to non-COD											x
showcodlicense	Display COD RTU licenses		x	x								x
showcodusage	Display COD usage statistics		x	x	x	x	x			x	x	x
setcod	Configure the domain component list and COD resources		x									x
showcod	Display COD information including platform type, domain information, and board information		x	x	x	x	x					x

Domain Administration Commands

Domain Administration Commands

Command	Description	useradm	platadm	platop	domainadm	domainmgr	domainop	auditadm	auditop	fieldeng	Service	Escalation
`poweron -a`	Turns on power to all domains		x							x	x	x
`poweron -d`	Turns on power to a specified domain		x		x	x				x	x	x
`poweroff -a`	Turns on power to all domains		x							x	x	x
`poweroff -d`	Turns off power to a specified domain		x		x	x				x	x	x
`reset`	Reset the specified domain		x		x	x				x	x	x
`showdcl`	Display domain component list		x	x	x	x	x			x	x	x
`setdcl`	Set up the domain component list		x									x
`showboards`	Display systemboard components		x	x	x	x	x			x	x	x
`showdevices`	Display system devices		x	x	x	x	x			x	x	x
`setupfru`	Set systemboard configuration		x							x	x	x
`showfru`	Display systemboard configuration		x							x	x	x
`addboard`	Configure XSB to domain		x		x							x
`deleteboard`	Unassign or disconnect XSB from domain		x		x							x
`moveboard`	Move XSB from one domain to another		x		x							x

Domain Administration Commands (Continued)

Command	**Description**	**useradm**	**platadm**	**platop**	**domainadm**	**domainmgr**	**domainop**	**auditadm**	**auditop**	**fieldeng**	**Service**	**Escalation**
`showdomainstatus`	Display domain OS status	x	x	x	x	x	x			x	x	x
`console`	Start or stop the console connection		x	x	x	x	x			x	x	x
`showconsolepath`	Display the console path	x	x	x	x	x	x			x	x	x
`sendbreak`	Send BREAK signal to domain		x		x							x
`setdomainmode`	Set the domain operation mode		x		x							x
`showdomainmode`	Display the operation mode of the specified domain		x		x					x	x	x

Maintenance Administration Commands

Maintenance Administration Commands

Command	Description	useradm	platadm	platop	domainadm	domainmgr	domainop	auditadm	auditop	fieldeng	Service	Escalation
`replacefru`	Replace PSU, FAN,PANEL, systemboards, or XSCF									x	x	x
`addfru`	Add PSU, FAN, PANEL, or systemboards									x	x	x
`deletefru`	Delete systemboards									x	x	x
`erasenvram`	Scrub the FRU nvram									x	x	x
`setaltitude`	Set the system altitude for filter replacement									x	x	x
`showaltitude`	Display the system altitude for filter replacement									x	x	x
`shownvram`	List system nvram contents									x	x	x
`switchscf`	Switch XSCF		x							x	x	x
`testsb`	Execute systemboard tests		x							x	x	x
`prtfru`	Display FRU-ROM data									x	x	x
`clockboard`	Set the master clock									x	x	x
`flashupdate`	Execute firmware updates		x							x	x	x

Logging Commands

Logging Commands

Command	Description	useradm	platadm	platop	domainadm	domainmgr	domainop	auditadm	auditop	fieldeng	Service	Escalation
`showlogs`	Displays the specified log data		x	x	x	x	x			x	x	x
`setarchiving`	Configures log archiving		x									x
`showarchiving`	Displays log archiving status		x	x						x	x	x
`showstatus`	Displays degraded units		x	x	x	x	x			x	x	x
`snapshot`	Collects environment, log, error, and FRUID data		x							x	x	x

Hardware Administration Commands

Hardware Administration Commands

Command	**Description**	**useradm**	**platadm**	**platop**	**domainadm**	**domainmgr**	**domainop**	**auditadm**	**auditop**	**fieldeng**	**Service**	**Escalation**
`showhardconf`	Display information regarding components installed in the platform	x	x	x	x	x	x			x	x	x
`setlocator`	Configure locator LED status		x							x	x	x
`showlocator`	Display locator LED status	x	x	x						x	x	x
`fmadm`	Fault management configuration tool (config)		x	x						x	x	x
`fmadm`	Fault management configuration tool (fault)										x	x
`fmadm`	Fault management configuration tool (flush)										x	x
`fmadm`	Fault management configuration tool (load)											x
`fmadm`	Fault management configuration tool (repair)										x	x
`fmadm`	Fault management configuration tool (reset)										x	x
`fmadm`	Fault management configuration tool (rotate)										x	x
`fmadm`	Fault management configuration tool (unload)											x
`fmdump`	View fault management logs		x	x						x	x	x
`fmstat`	Report fault management module statistics		x	x							x	x

Hardware Administration Commands (Continued)

Command	Description	useradm	platadm	platop	domainadm	domainmgr	domainop	auditadm	auditop	fieldeng	Service	Escalation
`showenvironment`	Display temperature, voltage, and fan speed information	x	x	x						x	x	x
`cfgdevice`	Connect and disconnect the DVD/ DAT drive to a domain		x							x	x	x
`setdumphost`	Configure the dump host		x							x	x	x
`showdumphost`	Display the dump host name		x	x						x	x	x

Service Processor Commands

Miscellaneous Service Processor Commands

Command	**Description**	**useradm**	**platadm**	**platop**	**mdomainad**	**domainmgr**	**domainop**	**auditadm**	**auditop**	**fieldeng**	**Service**	**Escalation**
`enableservice`	Enable service mode		x	x	x	x	x			x	x	x
`enableescalat ion`	Enable escalation mode		x	x	x	x	x			x	x	x
`service`	Change service mode		x	x	x	x	x			x	x	x
`escalation`	Change escalation mode		x	x	x	x	x			x	x	x
`showautologout`	Display session timeout	x	x	x	x	x	x	x	x	x	x	x
`setautologout`	Set up session timeout		x							x	x	x
`applynetwork`	Boot the XSCF and apply the network configuration		x									x
`setpowerupdelay`	Set warmup-time and air conditioner wait-time		x							x	x	x
`showpowerupde lay`	Display warmup-time and air conditioner wait-time		x	x	x	x	x			x	x	x
`setshutdowndelay`	Set the delay before powerfail shutdown		x							x	x	x
`showshutdowndelay`	Display the delay before powerfail shutdown		x	x	x	x	x			x	x	x
`setlookup`	Manages authentication and privilege choices	x										x
`showlookup`	Displays the configuration for authentication and privileges lookup	x								x	x	x
`setldap`	Configures the service processor as an LDAP client	x										x
`showldap`	Displays the service processor LDAP information	x								x	x	x

Miscellaneous Service Processor Commands (Continued)

Command	**Description**	**useradm**	**platadm**	**platop**	**domainadm**	**domainmgr**	**domainop**	**auditadm**	**auditop**	**fieldeng**	**Service**	**Escalation**
`setaudit`	Configure system auditing							x				x
`showaudit`	Display current audit status							x	x			x
`showdate`	Display current time	x	x	x	x	x	x	x	x	x	x	x
`setdate`	Set the current time		x							x	x	x
`showtimezone`	Display time zone setting	x	x	x	x	x	x	x	x	x	x	x
`settimezone`	Set the time zone		x							x	x	x
`showmonitorlog`	Display monitoring message		x	x						x		x
`setdomparam`	Configure OBP variable		x		x							x
`set locale`	Set locale		x									x
`showlocale`	Display configured locale	x	x	x	x	x	x	x	x			x
`setdefaults`	Restore XSCF to default settings											x
`exit`	Exit from the XSCF shell	x	x	x	x	x	x	x	x	x	x	x
`man`	Display manual pages	x	x	x	x	x	x	x	x	x	x	x
`clearfru`	Clear degraded FRU status from all FRUs											x
`clearfault`	Clear degraded status from the selected FRU										x	x
`setdualpowerfeed`	Set dual power mode									x	x	x
`showdualpowerfeed`	Display dual power mode status									x	x	x
`viewaudit`	Display audit records							x	x			x
`version`	Display the XCP version		x							x	x	x

`who`	Display the list of users that can access the service processor	x	x	x	x	x	x	x	x	x	x	x

Dynamic Reconfiguration